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THE

SUPPLEMENT

TO THE

PENNY CYCLOPÆDIA

OF

THE SOCIETY

FOR THE

DIFFUSION OF USEFUL KNOWLEDGE.

VOLUME I.

ABATI——GYROSTEUS.

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[The abbreviations P. C. and P. C. S. signify the Penny Cyclopædia and Penny Cyclopædia Supplement.]

ABATEMENT OF LEGACIES. [Legacy, P. C., p. 391.]

ABATI, or ABBATI, NICCOLO', was born at Modena in 1512. He is more frequently called Dell' Abate, but erroneously, according to the showing of Tiraboschi, as his family name was Abati. Before Tiraboschi, Niccolò's surname was supposed to be unknown, and the name of Dell' Abate was given to him from the circumstance of his being less known for his own works than as the assistant of Primaticcio, who was called L'Abate by the Italians after he was made Abbé of St. Martin near Troyes, by Francis I. of France. Abati executed in fresco the Adventures of Ulysses and other works from the designs of Primaticcio, for the palace of Fontainebleau, the decoration of which was intrusted to Primaticcio after the death of Il Rosso. Prints from the Adventures of Ulysses, by Van Thulden, were published in Paris in 1630: the original works were destroyed with the building, in 1738, to make room for a new structure.

Abati's own works however, in Modena and Bologna, were productions of the greatest merit, according to the Caracci; and in the celebrated sonnet of Agostino, which is a sort of recipe for making a great painter, he is mentioned in conclusion as combining in himself all the required excellences:—

> 'Ma senza tanti studi e tanto stento
> Si ponga solo l' opere ad imitare
> Che qui lasciocci il nostro Niccolino.'

There are few of Abati's works remaining, and these are chiefly frescoes; he seems to have painted comparatively little in oil. It is not known who his master was, or whether he had any other master than his father Giovanni Abati, who was an obscure painter and modeller of Modena. From a similarity in his works to the style of Correggio, some have supposed that he was a pupil of Correggio; he is also said to have studied under the sculptor Begarelli: if so, he was probably well acquainted with Correggio, with whom Begarelli was intimate.

His earliest essays upon his own account were in partnership with another painter, Alberto Fontana, a practice not unusual at that period in Italy, when there was little or no distinction between artists and artisans in the manner of employing them or estimating their works. In 1537 he painted with Fontana, at Modena, some frescoes in the butchers' market, by which he obtained some reputation; and he acquired great distinction by some frescoes in the Scandiano Palace, from Ariosto and the Æneid of Virgil, which are still extant; they have been engraved by Gajani. These, with some conversation-pieces and concertos in the Institute of Bologna, a Nativity of Christ under the portico of the Leoni Palace, and a large symbolical picture in the Via di San Mamolo, in the same city, are the only frescoes now extant by Abati; and his oil-pictures are likewise very scarce. Of the works in the Institute Zanotti has written an account—'Delle Pitture di Pellegrino Tibaldi e Niccolo Abbati,' &c., in which there are engravings of them: Malvasia also has given a laudatory description of them: they have been compared with the works of Titian. The Nativity of the Leoni Palace, which has been engraved by Gondolfi, is mentioned in the highest terms by Count Algarotti, who discovered in it 'the symmetry of Raphael, the nature of Titian, and the grace of Parmegiano.' Of his easel-pictures in oil the most celebrated is the Martyrdom of St. Peter and St. Paul, a large picture on wood, which was painted for the Church of the Benedictines at Modena, in 1546. It is now in the Dresden Gallery, and has been engraved by Folkema for the 'Recueil d'Estampes après les plus célèbres Tableaux de la Galerie de Dresde.'

From about 1546 until 1552, when he accompanied Primaticcio to France, Abati lived in Bologna, and his Bolognese works were painted during this interval: he died in Paris, in 1571.

Abati's principal faculty was painting in fresco, in which he had surprising facility. According to Vasari he never retouched his works when dry, which cannot be said of many fresco-painters; yet, says Vasari, the paintings of an entire apartment were executed with such uniformity that they appeared to be the work of a single day. Abati excelled in landscape, for his period: there is a Rape of Proserpine in the Duke of Sutherland's collection, of which the background is an extensive landscape; it was formerly in the Orleans Gallery, and was sold at the sale in this country for 160*l.*

Several of Abati's relations also distinguished themselves as painters: his brother Pietro Paolo was a clever horse and battle painter; his son Giulio Camillo, his grandson Ercole, and his great-grandson Pietro Paolo the younger, were all painters of ability, especially Ercole, who was born in Modena in 1563, and died in 1613; he executed, with B. Schidone, the frescoes of the council-hall of Modena.

(Vedriani, *Vite de' Pittori di Modenesi*; Tiraboschi, *Notizie de' Pittori, &c. di Modena.*)

ABERCROMBIE, JOHN, M.D., Fellow of the Royal Colleges of Physicians and Surgeons of Edinburgh, &c., was born on the 11th of November, 1781. He was the son of the Rev. Mr. Abercrombie, for many years one of the town-ministers of Aberdeen. Edinburgh was at the time the most distinguished seat of medical education in the empire. Applying his mind to that branch of professional knowledge, Abercrombie studied in the Scottish metropolis, and took his degree there on the 4th of June, 1803. He entered into practice subsequently in Edinburgh, and became a Fellow of the Royal College of Surgeons in the year 1805, thus qualifying himself to teach surgery, and taking the highest professional rank in that class. However, though he so far combined the practice of a surgeon with that of a physician even in his early career, according to a common Scottish custom, his disposition was better suited to the pursuits of the pure physician; and into these he fell altogether soon after the decease of the celebrated Dr. Gregory in 1821. Dr. Abercrombie from that time began to occupy the most prominent position as a practising and consulting physician, not only in Edinburgh but in all Scotland, and he was often called to great distances in the country. He became a licentiate of the Royal College of Physicians in 1823, and in 1824 was admitted a Fellow of the body. While receiving subsequent honours from his colleagues, his high position in after-life also gained for him many complimentary distinctions from other quarters. In 1834 the University of Oxford marked their estimation of his character and talents by conferring on him the honorary degree of Doctor of Medicine—a somewhat rare mark of respect to the alumni of Scottish universities. In the year 1835 Dr. Abercrombie was elected Lord Rector of the venerable Marischal College of Aberdeen. Of the other honours bestowed on him by public and private bodies, we need only notice his appointment to the vice-presidency of the Royal Society of Edinburgh, and to the office of physician in ordinary to her Majesty for Scotland. The numerous subsidiary places which he held, most of which were connected with benevolent societies, need not be enumerated. Dr. John Abercrombie died suddenly on Thursday, November 14, 1844, at his house in York Place. On a post-mortem examination, it was found that the bursting of the coronary artery of the heart had been the immediate cause of death.

The writings of Dr. Abercrombie contributed no less to the establishment and maintenance of his fame than his singularly useful career as a practical member of his profession. In the early part of his course he confined his literary labours to the 'Edinburgh Medical and Surgical Journal,' and other periodicals in his own department of science. His first distinct work of moment, leaving out of consideration published cases of disease and similar minor treatises, was one entitled 'Pathological and Practical Researches on Diseases of the Brain and the Spinal Cord,' Edinburgh, 1828, 8vo. In this work, which is characterised by no ordinary degree of purely scientific knowledge, he also gave an indication of the bent of his genius to the study of mind and its relations to the body. He published about the same time another professional volume, and one which elevated him still more highly among the modern cultivators of medicine, styled 'Pathological and Practical Researches on the Diseases of the Intestinal Canal, Liver, and other Viscera of the Abdomen,' Edinburgh, 1828, 8vo. Dr. Abercrombie seems now to have directed his thoughts to higher objects; and his two subsequent works form the most permanent monument to his memory. He began to throw together the medical facts accumulated in the course of his extensive experience and reading, and to examine their bearings on the various metaphysical and moral systems that have been established. The result of his labours is to be found in two works: the one entitled 'Inquiries concerning the Intellectual Powers and the Investigation of Truth,' Edinburgh, 1830, 8vo.; and the other called 'The Philosophy of the Moral Feelings,' London, 1833, 8vo. The latter is in some measure a sequel to the first, and the whole composes a view of human nature intellectually and morally, in which the facts of science and the revelations of religion are combined together in peculiar harmony. The best of these two works in every respect is perhaps that on the Intellectual Powers. It is not so much the product of profound original research, as the result of the quiet meditations of a superior mind aided by all the advantages of much reading and large practical experience. The work is more reflective than penetrative or suggestive. In particular the light thrown by the author on those curious cases of spectral illusions which have so long interested the medical profession, is a proof at once of Dr. Abercrombie's powers and skill in his profession, and of his capacity for investigating the difficulties of mental philosophy. In so brief a sketch as the present it is impossible to do full justice to such a man as Dr. Abercrombie. For range of acquirements, solid as extensive, he stood unequalled among the Scottish physicians of his day. He earned by his writings a name that will not be forgotten, and he will long be remembered, as a private individual, for his singular piety and benevolence.

ABERDEENSHIRE, a maritime county in the east of Scotland, bounded on the north-east and east by the North Sea, on the south-east by Kincardineshire, on the south by Forfarshire, on the south-west by Perthshire, on the west by Inverness-shire, and on the north-west by Banffshire. Its form is irregular, having its greatest length from east-north-east to west-south-west, from Rattray Head between Peterhead and Fraserburgh to the junction of the three counties of Perth, Inverness, and Aberdeen, 88 or 89 miles; and its greatest breadth at right angles to the length, from the border of the county of Banff, near the town of Banff, to the mouth of the Dee, 38 miles. A small part of Banffshire (the parish of St. Fergus) is insulated by this county and by the sea near Peterhead. The area of Aberdeenshire, including the few lochs, which are small, is estimated at 1970 square miles (some statements make it rather less); it is in size the fifth of the Scottish counties, being 668 square miles less than Perthshire, the next county above it, and 169 miles greater than Sutherlandshire, the next below it. The population at the different enumerations in the present century was as follows:—1801, 123,082; 1811, 135,076; increase in ten years 10 per cent.; 1821, 155,387, increase 15 per cent.; 1831, 177,657, increase 14 per cent.; 1841, 192,283, increase 8·2 per cent. In the ten years from 1821 to 1831 the rate of increase slightly exceeded the average of Scotland; but during the rest of the period it has been below the average. According to the census of 1831, which we retain to facilitate comparison, there were 90 persons to a square mile. It was then the third of the Scottish counties in amount of population, being exceeded only by Lanarkshire and Edinburghshire; and the thirteenth in density of population, being next below Kinross-shire and next above Elginshire. According to the census of 1841 it retains its place in the scale both of amount and density of population: it had then betwen 97 and 98 inhabitants to a square mile.

Coast-line.—The coast of Aberdeenshire has a tolerably regular outline, for the most part convex to the sea. From the mouth of the Dee, which separates the county from Kincardineshire, it preceeds in a tolerably direct line for 12 miles north by east or north-north-east to the mouth of the Ythan. The Don and several smaller streams fall into the sea in this part of the coast: the mouth of the Don is about two miles north of the mouth of the Dee; the outfal of the other streams is more to the northward. From the Ythan the coast at first runs a little more to the eastward, but turns gradually to the north, north-west, and west, forming nearly a semicircle of about 55 miles, measured along the shore to the mouth of the little stream which separates the county from Banffshire. In this semicircular sweep the coast has several headlands, but of little prominence: they are White-ness, Briggs-head, Bows-ness, Boddam or Buchan-ness, Invernetty-point or Salthouse-head, Inchkeith-point (the last three in Peterhead parish, and near the town of that name), Rattery or Rattray-head, Tillyduff-point, Cairnbulg-point (all three between Peterhead and Fraserburgh), and Kinnaird's-head near Fraserburgh. Fergus-head or Scotstown-point is in the detached part of Banffshire, between Inchkeith-point and Rattray-head. Buchan-ness and Inchkeith-point are the easternmost points of the mainland of Scotland: they are in 1° 45′ W. long. There is a lighthouse 118 feet high, built of granite, with what is termed 'a flashing light,' on Buchan-ness. The bays between the mouth of the Ythan and the point where the boundary between this county and Banffshire meets the coast, are—Cruden bay, between Briggs-head and Bows-ness; Invernetty or Sandford bay, between Buchan-ness and Salthouse-head; Peterhead bay, between Salthouse-head and Inchkeith-point; St. Fergus bay between Scotstown-point (in the detached part of Banffshire) and Rattray-head; Strathbeg or Strabeg or Rattray bay (which at low water becomes a loch, communicating with the open sea by a narrow passage adjacent to Rattray-head on the north-west); Fraserburgh bay, between Cairnbulg-point and Kinnaird's-head, Fingus bay, west of Kinnaird's-head; and Aberdour bay, near the Banffshire boundary.

The coast from the border of Kincardineshire northward to the mouth of the Ythan is comparatively low and shelving: from the mouth of the Ythan it assumes a bolder character, being skirted in some places by rocks rising 170 or 200 feet above the level of the sea. These rocks are penetrated by some remarkable fissures and caverns which formerly afforded great facilities for the concealment of smuggled goods. The rocks are chiefly of black basalt, gneiss, mica slate, or red granite. About Peterhead they form mural precipices. Some of the bays which indent this generally bold coast have a flat beach of sand or pebbles. North of the Ugie, which joins the sea just to the north of Peterhead, the shore loses its abrupt and lofty character, and presents a line of clay hills covered with an accumulation of drift sand; near Rattray-head there is a ridge of rocks projecting into the sea, by which at high water they are covered. Beyond Rattray-head the coast is low and sandy to Kinnaird's-head, a promontory of considerable height; westward of which the coast is sometimes sandy, sometimes lined with rocks, in which are some remarkable caves. One of these caves served as a hiding-place to Lord Pitsligo after the battle of Culloden in 1746. There are no islands on the coast deserving of notice.

Surface and Geology.—The county is generally hilly; in the south-western part it is mountainous. The crest of the principal range of the Grampians forms, for a considerable distance, the southern boundary, separating Aberdeenshire from Perth, Forfar, and Kincardine shires. A branch of the Grampians, thrown off from the principal range at Badenoch forest in the south-western extremity of the county, forms for a short distance the western boundary, and separates Aberdeenshire from Banffshire. From this branch another branch is thrown off towards the north-east; and although no distinctly marked chain of hills can be traced far, the elevation of the surface in this direction is apparent from the course of the waters; the upper waters of the Don, the Ythan, and the Ugie, flowing down the south-eastern slope, and several streams flowing down the north-western slope into the Dovern or Doveran, which belongs chiefly to Banffshire. The principal summits in the main range of the Grampians, on the southern boundary, enumerated in their order from west to east, are—Scarsoch, Craigan Loch, Gelly Cairn, Ben Uarn, Cairn Leay, Ben Barrow, Glash Mell, Aught Hill, Cairn Tagart or Taggart (about 3000 feet high), Loch na Gar (3815 feet), Hill of Mark, Mount Kean (3126 feet), Braid Cairns, Cockairns, Hill of Cat, and Mont Battack. The principal summits of the branch on the western boundary are—Cairn Toul (4220 feet), Breriach, close to Cairn Toul, and about the same height, and Ben Macdhui, or Bennamuickduidh (4390 feet), ascertained by the Ordnance Survey to be 20 feet higher than Ben Nevis, hitherto regarded as the highest mountain in Great Britain. On the branch thrown off from that just mentioned, and running to the north-east, are Bennabuird (3940 feet), Ben Aven or Ben Avon, and Morven (2934 feet).

The mountain district of Braemar, in which or the neighbourhood most of these peaks are included, is chiefly granitic: the mountains frequently present tabular summits with steep precipitous sides. Ben Macdhui has on its sides precipices of more than 1000 feet high. Conical summits are not so frequent, but Cairn Toul and Loch na Gar have this form. The sides of the mountains vary in character, presenting sometimes mural precipices, sometimes slopes more or less steep: at the foot of the precipices or steeper slopes considerable masses of granitic débris are observable. The granite of Braemar is chiefly pure; the mica is the least of its constituent minerals: the felspar and quartz are in about equal proportions. Some of the granite is porphyritic. In the upper part of the valley of the Dee a large mass of syenite is found; but this belongs chiefly to Perthshire, if not entirely.

The neighbourhood of Aberdeen, extending for some miles round that city, especially towards the west, is occupied by granite. The limits of this granite district do not appear to be well ascertained, but it extends westward as far as Midmar parish, and is found even as far as Coull and Tarland parishes. The principal mass of granite forms rounded hills west of Aberdeen between the Don and the Dee, and extends to the northward of the Don. The granite is neither very coarse nor very fine grained. It is quarried in large quantities (chiefly of grey granite), and shipped at Aberdeen for London and other places.

Granite is found in various other parts of the county; in the parishes of Keig, Premnay, Monymusk, Oyne, Daviot, and Chapel of Garioch, near the banks of the Don, and of the Urie, which flows into the Don; in those of Udny, Ellon, and Tarves, near the banks of the Ythan; in those of Huntly, Drumblade, and Glenbucket, near the Doveran; and in those of Fraserburgh, Longside, and Peterhead, near the coast. It is quarried in Drumblade and Peterhead parishes. The granite is frequently found disintegrated, at least in so friable a state as to be easily dug into by the pickaxe and spade; yet large blocks of fine building-stone, capable of resisting the action of the weather, are frequently quarried in the midst of a mass of disintegrated rock.

Syenite is found in various parts, especially in the parishes of Peterhead and Lonmay near the coast; in Alford and Methlick parishes in the interior; and in Strathdon and Glenbucket, near the head of the Don. Gneiss is found in the districts adjacent to the granite, but not in great quantity. The predominant rock in the county is mica slate. In the parts adjacent to the granite it is quartzose and very compact, showing a tendency to pass into gneiss, or alternating with that rock. Serpentine and primitive limestone are found in a few places. Clay slate, grauwacké, and grauwacké slate are found in the parishes of Aberdour, Turriff, and King Edward, in the northern part of the county, adjoining Banffshire. Red sandstone (apparently the old formation) is found in the same three parishes, and in the adjacent parish of Monquitter. Magnesian limestone is said to be found in the parish of Tough. Trap rocks are of continual occurrence in the inland and hilly parts of the county; and veins or dykes of trap are observed in parishes near the east coast. (Boué, *Essai Géologique sur l'Ecosse*; *New Statistical Account of Scotland.*)

Hydrography and Communications.—The principal rivers of the county are the Dee, the Don, the Ythan, the Ugie, and the Deveron or Dovern or Doveran, with their respective tributaries. We have enumerated them in the order of their outfal from south to north and west, from Kincardineshire to Banffshire.

The Dee rises in the south-western part of the county, in the mountains which there separate Aberdeenshire from Inverness-shire. It rises high up the side of the mountain Breriach, at an altitude of above 4000 feet, and flows for about 11 or 12 miles in a south-south-east direction to the junction of the Geonly or Geauly, a stream 10 miles long. From the junction of this stream its course is east by north for about 12 miles to Newton, below the castle of Braemar. In this part of its course it receives several mountain-streams, as the Lui and the Queich or Coich, each about 10 miles long, on the left bank, and the Ey and the Clunie or Cluanadh, about the same length, on the right. In the upper part of the Dee there are several falls, or as they are termed 'linns,' of which the principal, not from its height, but its turbulence, is the Linn of Dee; the river here forces its way by four successive falls or rapids through a passage of rock, so narrow in some places that some persons have been hardy enough to step across it. The falls of Coirmulzie and Garvalt, both below the Linn of Dee, are also much admired. From Newton the Dee flows about 7 miles north by east to the kirk of Crathie, and then turning to east by north, flows, with some slight variations, in that direction about 60 miles to its outfal at Aberdeen. Its whole course is above 90 miles. In the 'Gazetteer of Scotland,' published by Fullarton and Co. of Glasgow, and in Chambers's 'Gazetteer of Scotland,' its length is estimated at 96 or 97 miles. About 24 miles above its outfal it quits Aberdeenshire to enter Kincardineshire; but after flowing about ten miles through Kincardineshire, returns to the border of Aberdeenshire, and for the rest of its course separates the two counties. It receives the Gairden or Gairn, 18 miles long, on the left bank, about six miles below Crathie kirk; and the Muick, 12 miles long, on the right bank, about two miles lower down. In the upper part of the Muick are two small but picturesque lakes. Dhu-loch, 'the Black Lake,' is supposed to obtain its name from its being overshadowed by the lofty cliffs of Craig Dhu-loch, which rise from its southern border to a height of more than 1000 feet. A mountain rill falls into it on the north side from a height of more than 200 feet. Loch Muick is about two miles long, from south-west to north-east, and half a mile broad. It receives a stream from Dhu-loch and others from the surrounding mountains; and its waters are remarkable for their coldness even in the midst of summer. There is a small island near its south-western end, where sea-gulls are always to be found. A little below the Muick, another stream falls into the Dee on the left bank: this stream is the outlet of two small lakes; Loch Connor, surrounded by birch-woods and studded with small islands, and Loch Dawan. The Dye, the largest feeder of the Dee, with the Aven its tributary, belong chiefly to Kincardineshire: the Dye joins the Dee on the right bank in Kincardineshire. Two small lakes, Loch Drum and Loch Skene, are connected with the Dee by streams which flow into it on the left bank, after it again touches the border of the county.

The Dee is, from the declivity of its bed, which has a fall of 4000 feet in less than 80 miles, a rapid stream. Its average fall from Aboyne, 30 miles above its outfal, to Aberdeen, is about ten feet in a mile. Its inundations sweep away the good soil of the country through which it flows, and leave instead of it an unproductive sand. It is chiefly valuable for its salmon fishery, the yearly produce of which is estimated at 8000*l*. The mouth forms the harbour of Aberdeen.

The Don rises just on the western border of the county, in the parish of Strathdon; its source is elevated about 1640 feet above the level of the sea: its course is very winding; first north-east, to the neighbourhood of Kildrummy kirk, 30 miles; then eastward, about 28 miles, to Inverury; and then south-east, about 20 miles, to its outfal in the North Sea at Old Aberdeen. Its whole course is about 78 miles. In the Gazetteers already quoted it is called 62, which we believe is much too little. The Don rises in a peat moss: in the upper part of its course it is a very rapid river, shallow, and subject to inundations, of which that of 1829 was very destructive. It receives several mountain-streams in the upper part of its course, and at the manse of Strathdon is 70 feet wide: it affords excellent angling for small trout. At Keig, midway between Kildrummy and Inverury, it is 140 feet broad; but still very shallow. At Inverury it receives the Urie or Ury, its most important tributary. Its course is here very slow; but it is still liable to overflow, and this liability has been increased of late years by the number of drains cut for agricultural purposes. The Don was formerly much frequented by salmon of excellent quality: they ascended the stream at the end of September, and returned to the sea about the beginning of April. The salmon fisheries at Kintore, about 12 miles above its mouth, were of considerable value; but a great proportion of the fish are now intercepted by stake-nets at and near the mouth of the river. The salmon fishery of the Don is of less value than that of the Dee. Pearls are said to have been found in the Don formerly, but none are obtained now. It is navigable only to the bridge of Old Aberdeen, and that only for small craft. The Urie, the most important feeder of the Don, rises in Gartly parish, and flows by Culsamond and Rayne into the Don, which it joins on the left bank at Inverury: its course is about 24 miles. The tributaries next in magnitude are the Earnon or Ernan, the Noughty or Nochtie, and the Bucket, all of which join it on the left bank in the order of enumeration, above the junction of the Urie; and the Leochel or Leochal, which joins it on the right bank at Alford below Kildrummy.

The Ythan rises in the parish of Forgue near the north-western border of the county; and flows first 4 miles eastward, then 5 miles north-east to Towie, the antient seat of the Barclays, and from thence its course is, with some variation, south-east, by Fyvie kirk, the village of Ellon, the kirk of Logie Buchan, and the village of Newburgh, 28 miles into the North Sea. Its whole course, by measurement on Arrowsmith's Map of Scotland, is about 37 miles: in the 'New Statistical Account of Scotland' it is stated at above 27 or 28 miles in one place (Account of Ellon Parish) and 31 in another (Account of Fyvie Parish); but we consider both these statements as below the truth. The Ythan is a slow and gentle stream; but from the more extensive system of drainage adopted in the lands through which it flows, it is subject to rise more suddenly than in former years. It has a considerable volume of water; but near the sea it spreads out into a wide shallow basin, so as to be navigable only for small craft, except just within the mouth. The entrance is obstructed by a bar; and the shifting sands in the channel render the navigation dangerous. Vessels of 70 to 90 tons go up to Newburgh, which is scarcely a mile up the river, and flat-bottomed lighters of from six to twelve tons get up with the tide almost to the village of Ellon, four miles higher, and carry coals, lime, and bones to different landing-places. It is thought that the navigation might be considerably extended and improved. The river abounds with fish, as trout of various kinds, including salmon-trout and bull-trout; finnock, eels, flounders, and salmon. The salmon and sea-trout ascend the river in summer, and return to the sea in March and April of the following year. The salmon fishery has been less successful of late years: there are two fishings, one at the mouth of the river, the other at the village of Ellon, about five miles up the stream; but the latter has become of little consequence from the introduction of stake-nets along the coast. Seals have been occasionally seen in the river near the kirk of Logie Buchan, about two or three miles above the mouth. Many hundred tons of mussels and cockles are taken yearly. The pearl-mussel is found, and the pearl fishery was formerly thought of sufficient importance to be the subject of a grant by patent. There is a prevalent tradition that the large pearl in the Scottish crown was found in the Ythan, or in the Kelly, one of its tributaries; and about the middle of the last century a gentleman of Aberdeen received 100*l.* from a London jeweller for pearls found here. But few of any value are found now: it is a favourite amusement for schoolboys to fish for them in summer when the water is low. The tributaries of the Ythan are all small; the Blackwater or Littlewater or Water of Gight joins it on the left above Methlick kirk; the water of Kelly on the right below Methlick kirk, the Ebrie on the left between Methlick kirk and the village of Ellon, and another stream from Udny kirk on the right a little above Ellon. The first and the last two are each about eight miles long, the third about twelve miles long.

The Ugie is formed by two streams, of which the North Ugie rises to the south of Aberdour and flows south-east by the kirk of Strichen; the South Ugie rises between Strichen and Monquitter kirks, and flows east by south. The streams have a course, the first of about 15, the second of from 18 to 20 miles above their junction. Their course below the junction is about 5 or 6 miles into the North Sea at Buchan Haven near Peterhead. From the trifling declivity and winding course of its channel the Ugie is a very slow stream: it is apt to overflow after falls of rain, where pains have not been taken to deepen its channel or to restrain its waters by embankments. It contains an abundance of black or burn trouts; but few salmon are found in it. It is navigable just at the mouth, but might be rendered navigable, at a small expense, for some miles higher up.

The Deveron or Dovern or Doveran belongs partly to Banffshire, partly to Aberdeenshire; and sometimes separates the two counties. Its source and upper part for about seven or eight miles, in which its course is northward, belong to Aberdeenshire: it is augmented in this part by a number of small streams. After flowing about 5 miles north by east through Banffshire, it touches the border of the two counties, along which it flows for 2 or 3 miles, still north by east, and then enters Aberdeenshire. Its course now becomes circuitous, first turning eastward and then northward, till after flowing for about 13 miles through Aberdeenshire (in which, near the town of Huntly, it receives on the right bank the Bogie Water, one of its principal tributaries, which flows northward 17 miles by Achindore, Kearn, and Gartly kirks), it returns to the border. The remainder of its course, about 23 miles first eastward and finally northward, is partly in Banffshire, partly on the border. Its whole length is about 51 miles. It is a rapid stream, flowing for a considerable part of its course through a deep narrow vale, and is subject to serious floods. Both the Bogie and the Deveron contain excellent trout; pearls of trifling value are sometimes found in the Deveron, in which, near the mouth, a considerable salmon fishery is carried on. The burns of Turriff and King Edward (13 miles and 9 miles long respectively), which join the Deveron on the right bank, belong to Aberdeenshire; the more important tributaries, the Blackwater and the Cantly, which join it on the left, belong wholly or chiefly to Banffshire.

Of smaller streams, the Cruden, about 8 miles long, flows into the North Sea between the Ythan and the Ugie; and the Rathen, 11 miles long, between Cairnbulg Point and Kinnaird's Head, near the town of Fraserburgh.

Aberdeenshire does not contain any lakes of importance. Dhu-loch, and Lochs Muick, Cannor, Dawan, Drum, and Skene, have been already mentioned in our notice of the river Dee.

The only canal in the county is the Aberdeenshire canal, which begins in the harbour of Aberdeen and runs up the valley of the Don parallel to the course of that river and near to it on the right bank, and terminates at Port Elphinstone in Kintore parish, but close to the town of Inverury. This canal was formed under acts obtained in 1793 and 1796, and was opened in 1807: its length is 18½ miles; its width was originally 17 feet and its depth 3 feet, but these dimensions have been enlarged, so that it is now from 21 to 23 feet wide and 3½ feet deep. Another statement gives the breadth as averaging 25 feet, the depth 3¾ feet. The expense of the construction and enlargement was nearly 40,000*l.* There is a tide-lock connecting the canal with the harbour of Aberdeen, and seventeen other locks, the greater number of which are at the lower end of the canal within 3 or 4 miles of Aberdeen. The total fall is about 133 feet to high-water mark in Aberdeen harbour. The trade of the canal has been on the whole increasing: lime, coal, dung, bones, and bark are carried up; and stone, slate, grain, and meal brought down. A passage-boat runs daily from Aberdeen to Port Elphinstone.

The principal roads are as follows: 1. From Edinburgh by Montrose to Aberdeen (entering the county at Dee bridge near Aberdeen), continued by Ellon and Cruden to Peterhead, and from thence to Fraserburgh. There is a shorter road from Ellon to Fraserburgh, more inland than the road by Peterhead. 2. From Aberdeen by Old Meldrum, Turriff, and King Edward to Banff. 3. From Aberdeen by Kintore, Inverury, and Huntly, to Elgin and Inverness. 4, From

Aberdeen up the valley of the Dee by Peterculter, Drumoak, Kincardine O'Neil, Ballater, and Tulloch, to Castletown of Braemar; and from thence southward across the Grampians to Blair Gowrie and Perth. 5. From Peterhead by Longside and Old Deer to Banff.

Soil and Agriculture.—The soil of the county varies much. Our notices of it and of the state of agriculture, being derived from the New Statistical Account of Scotland, refer to particular parishes, of which we shall select those which may be considered as representing those districts of the county in which they are respectively placed.

The united parishes of Braemar and Crathie, containing about 200,000 acres, or 312 square miles, comprehend the highlands about the source of the Dee. This district has a variable but healthy climate, and is watered by a number of mountain-streams, affluents of the Dee, which flows eastward through the middle of the parish. The soil is loamy, generally dry, resting sometimes on dry yellow clay, but more frequently on gravel. By far the greater part of the parish is uncultivated, and from 10,000 to 11,000 acres are covered with wood. The natural woods consists of birch, alder, poplar, and mountain ash; there are no oak coppices. The planted woods are chiefly larch and Scotch firs; other species of the fir are less common. Some of the Scotch firs are of immense size, and are reputed to be from 300 to 400 years old. The fir timber of the forest of Mar is, for size and quality, the first in the British Islands. This forest is well stocked with red-deer and roes: it affords also good pasturage. The quantity of cultivated land is but small. The black-faced or Linton is the prevalent breed of sheep; and the small black-horned breed of cattle. The adjacent highland parish of Strathdon (about 67,300 acres, or 105 square miles) has less natural wood; and the wood is chiefly birch. The soil in the strath or valley of the Don is good deep loam, resting chiefly on gravel. On the tops of the hills are peat-mosses of considerable extent. The quantity of arable land is about 4500 Scotch acres, and there are 3000 acres of plantation, chiefly larch and Scotch fir. Agriculture has been making steady progress for many years; and much land has been brought into cultivation by trenching and drainage. Lime is the general manure, an abundance of it of good quality is dug in the parish, and each farm has commonly its lime-kiln. The usual rotation of crops occupies seven years; oats are grown for two successive years, and are succeeded by turnips or some other green crop; the green crop is followed by bear or bigg, and hay; and the land is used for pasture for the two remaining years. No wheat and but little English barley is grown; the Angus and Scotch birley oats, and the green and red topped yellow turnips, are the favourites. The turnip crops are excellent: the soil suits the potato, but the danger of ruin to the crop from the early frosts prevents the cultivation of it. Leases are generally for nineteen years. The farm-houses are commodious, and the offices are generally of a superior description, built of stone and lime, with slated roofs. There are several thrashing-mills in the parish, in which water is the moving force.

The parishes of Lumphanan, Kincardine O'Neil, Alford, and Tough occupy a considerable district between the Don and the Dee, midway between the sources of those rivers and their outfal. The area of these parishes may be stated in round numbers at 40,000 acres, probably more; of which 16,000 acres, or about two-fifths, are under the plough, and about 6300 acres are occupied by plantations. The principal farms are held on lease for nineteen years; and the rent of arable land may be stated at an average of from 14*s*. to 21*s*. per imperial acre, in the several parishes the two nearest the Dee, Kincardine O'Neil and Lumphanan being the highest. The farms are from 50 to 150 acres, the generality of them about 100; besides which there are a number of 'crofts,' or small farms, of from 3 to 6 and occasionally of 10 or even 20 acres, held either of the landowners or by sub-lease, and often for a shorter term than nineteen years. The principal manure is lime, imported from Sunderland into Aberdeen. Bone manure is a good deal used, sometimes with dung. The rotation of crops occupies seven years; turnips are succeeded by bear or more commonly oats with grass seeds; then the land is laid down to grass for three years, the first of the three years affording a crop of hay from red and white clover and rye grass: then two successive crops of oats are taken. Some new leases bind the tenant to a six-years shift, one oat crop being omitted. The Angus, Scotch birley, and red oats are those chiefly grown. Drains both open and covered have been executed to a considerable extent: they are cut three or four feet deep, or more if requisite; rough stones are shot in and covered with heath and then with earth. Trenching is but little resorted to except in bringing fresh land into cultivation. The farm-houses and offices are most of them tolerably substantial and commodious, built of stone, and roofed in some cases with slates, in others with straw or heath, which forms a more durable thatch than straw. A light plough with two horses or oxen has superseded the old heavy plough with its five or six yokes of oxen. A considerable part of the arable land is enclosed and divided by dry stone walls. Thorn hedges have been introduced within the last few years, and are extending. Much of the arable land is still unenclosed. Thrashing-mills and machines are common. The number of sheep and pigs reared is not great. The sheep are of the Leicester or of a merino cross breed; there are a few of the black-faced sheep on the hills. A considerable quantity of lean stock is reared for the English markets. The cattle are pastured in summer: from October to May they are housed and fed with turnips and oat straw, so as just to keep them in growing condition. They are usually brought to market at three years old, sometimes at four years. The cattle are chiefly the long-horned black or brown Aberdeenshire breed; crossed sometimes with the West Highland and occasionally with the Teeswater breed; sometimes with the Galloway bull. The horses are of the old small-sized hardy breed of the country, or of larger breeds introduced from the south of Scotland or from England. The plantations are chiefly of the Scotch fir and larch: those of the Scotch fir have frequently been unsuccessful from the prevailing error of planting too close; but though the error has not been rectified, its effects are to a considerable extent counteracted by greater attention to early thinning.

Cruden, Slains, and Foveran lie on the coast, south of Peterhead, near the mouth of the Ythan; and Logie Buchan and Ellon adjoin them on the inland side. Of the area of these five contiguous parishes we have no estimate: they form a district extending along the coast for about 14 miles; and stretching in some parts 8 or 9 miles inland: if we calculate their area at about 100 square miles, or 64,000 acres, we shall not greatly err: probably four-fifths of this area are under cultivation. The woodlands are unimportant: it is likely they do not exceed 250 or 300 acres, chiefly in the parish of Ellon, the most inland of the five parishes. The wood is chiefly larch and Scotch fir, which thrive tolerably well in Ellon, but not in the immediate neighbourhood of the coast. The soil varies much: in the northern part of Ellon it consists chiefly of a loose black peaty earth, with a plentiful admixture of white sand, resting on a white gravelly subsoil, and of a very unproductive character. In the eastern part of the same parish the soil is a deep clay, retentive and unproductive, but in the southern part near the banks of the Ythan and its affluents the soil is more fertile. In the parish of Slains the soil is chiefly clay; but there is a considerable tract of fertile loam. Leases are generally for nineteen years; and the rent of land varies very much. Inferior arable land lets at 10*s*., 15*s*., or 20*s*. per Scotch acre, better land at from 2*l*. to 2*l*. 10*s*., and near the villages at 4*l*. and 5*l*. per acre: the Scotch acre is equal to about an imperial acre and a quarter. Sometimes the rent is paid in grain. Great improvements have taken place in husbandry, which is generally very good. 'Perhaps no part of the country possesses a more industrious or enlightened tenantry, and there are certainly few districts in which the state of agriculture exhibits a healthier or more improving aspect.' (*New Statistical Account*—Parish of Ellon.) Draining; enclosing, partly by ditches, partly by stone dykes; the introduction of new manures, the substitution of the scythe for the sickle, the use of thrashing-mills and machines, and of improved ploughs and other agricultural implements, and the erection of better farm-houses and offices, are the principal improvements. Some years ago the usual rotation of crops was a five-years shift, comprehending a succession of turnips, grain, pasturage for two years, and grain: but experience has led many farmers to substitute a seven-years shift, comprehending a green crop (usually turnips); oats, or sometimes bear; pasturage for three years; and oats for two years, or occasionally oats for one year, succeeded by bear. The cultivation of wheat was attempted to some extent about thirty years since, but as it was found not to ripen except in favourable seasons, its cultivation has been given up. Peas were formerly grown as a variety of the green crop, but are now seldom sown. Sometimes only one grain crop is taken after the three years' pasturage, and the rotation is thus reduced to six years. Very little hay is made. The cultivation of turnips has been greatly extended in consequence of the facilities afforded by steam-navigation for conveying fat cattle to the

London market, and the consequent increase of stock; and this extended cultivation has been aided by the introduction and general use of bone-dust, which is found to answer admirably as a manure for light soils that have been long under cultivation. English lime is extensively used for manure in the clayey soils, and on the lighter soils in combination with bone-dust. The kinds of turnips grown are the green-tops and red-tops, with yellow bottoms; the ruta baga, chiefly for feeding in May and June; and a few tankard turnips. The cultivation of oats is much greater than of bear, especially in the inland parishes. The breed of horses has been improved by the introduction of superior Clydesdale mares and other west-country breeds. The cattle were formerly chiefly of the Aberdeenshire horned and Angus polled breeds, but of late years the Teeswater short-horned cattle have been gaining ground, being valued as attaining to earlier maturity and greater size. Sheep-farming is not much attended to. The farm-houses of modern erection are generally of two stories, built of stone and lime and covered with slate, neatly finished and comfortably fitted up, approached by smooth roads of easy ascent, in place of the steep and rugged tracks that formerly led to them. The formation of new turnpike-roads and the improvement of other roads have been important aids to the general advancement of agriculture.

Divisions, Towns, &c.—The county comprehends the five antient districts of Mar, Formartin, Buchan, Garioch, and Strathbogie, which are not at present recognised for any administrative purposes. Mar, sometimes written Marr, comprehends that part of the county which lies south of the Don: it is subdivided into Brae-mar, Mid-mar, and Cro-mar. Mar gives the title of earl to a branch of the family of Erskine. Formartin or Formartine comprehends the country on the coast between the Don and the Ythan, and extends inland up the right bank of the Ythan to the border of Banffshire: it gives the title of viscount to the earl of Aberdeen. The district of Buchan comprehends that part of the county which lies north and north-east of the Ythan; but the earldom of Buchan appears to have also included Formartin. The title of earl of Buchan still belongs to a branch of the Erskine family. Garioch is an inland district, about the Urie and its feeders, not so extensive as the modern district and presbytery of Garioch. Strathbogie is an inland district, comprehending, as its name indicates, the valley of the Bogie, one of the affluents of the Deveron, and also including part of the valley of the Deveron itself near the junction of the Bogie. At present the county is divided for administrative purposes into the eight districts of Aberdeen, Alford, Deer or Buchan (comprehending only a part of the more antient district of Buchan), Ellon, Garioch (more extensive than the antient Garioch), Kincardine O'Neil, Strathbogie (less extensive than the older Strathbogie), and Turriff or Turreff. These modern districts are nearly coincident with the several presbyteries of the same name. The population of these districts at the enumerations of 1831 and 1841 was as follows:—

	1831.	1841.	Movement of Population in ten years.
Aberdeen district, including the city and burgh of Aberdeen . . .	69,778	76,938	7,160 increase
Alford district . . .	11,923	12,091	168 do.
Deer or Buchan do. . .	30,475	34,345	3,870 do.
Ellon	12,831	14,418	1,587 do.
Garioch	15,787	16,852	1,065 do.
Kincardine O'Neil . .	15,415	14,987	428 decrease
Strathbogie . . .	9,718	9,762	44 increase
Turriff or Turreff . .	11,730	12,994	1,264 do.
	177,657	192,387	14,730 do.

The county contains the city and royal and parliamentary burgh of Aberdeen, the population of which, in 1841, within the parliamentary boundary, was 63,288 [Aberdeen]; the royal and parliamentary burghs of Inverury, Kintore, and Peterhead; the burghs of barony of Charlestown, Fraserburgh, Huntly, Old Meldrum, Rosehearty, and Turriff.

Inverury is in the district of Garioch, 15 miles north-west of Aberdeen, on the left or north bank of the Don, in the angle formed by the junction of the Urie. There is a substantial modern bridge over each stream. The town consists of a long straggling street, running from south-south-east to north-north-west. The church, built in 1775 for 700 persons, is insufficient for the increased population; and a new church of Gothic architecture, sufficient for more than 1300 persons, was in 1842 in course of erection: there are a neat Episcopalian chapel, built in 1842; and places of worship for Independents and Methodists. The population of the burgh, which includes the town and the suburb of Port Elphinstone (which is in Kintore parish), was, in 1841, 1619; that of the whole parish (including Port Elphinstone), 2020, having been quadrupled within the present century: the burgh had 289 houses, namely, 274 inhabited, 10 uninhabited, 5 building. The opening of the Aberdeen Canal has much promoted the prosperity of the place. It has twenty large horse, cattle, and sheep fairs in the year, held every fortnight in winter and every month in summer. About sixty hand-looms are employed in weaving linen. Lime and coals are brought from Aberdeen by canal, and grain, slates, and timber sent down. Inverury was probably a burgh as early as the reign of William the Lion, near the end of the twelfth century: its privileges were renewed by a novodamus, A.D. 1558; and it was made, in 1663, head of the earl of Mar's regality of Garioch. The burgh has a provost, three baillies, a dean of guild, a treasurer, and three councillors. It is included in the Elgin district of Parliamentary burghs, and had in 1835-6 a constituency of 78, and in 1839-40 of 94. There are in the parish, the parish school, with about 90 scholars on the average; and five other schools, chiefly kept by females, for reading, sewing, and knitting. There is a savings'-bank.

Kintore is in the district of Garioch, 12 miles north-west of Aberdeen, in the peninsula formed by the Don (which here flows in a very winding channel to the south-east), the burn of Tuach, which joins the Don on the right bank, and the Torry burn, which flows into the Tuach. The town consists chiefly of one street, running from a bridge over the Tuach burn from east-south-east to west-north-west. There is a bridge over the Torry burn, and two bridges over the Aberdeen Canal. The church, which was built in 1819, and will accommodate 700 persons, stands in the town, and there is a town-house, a respectable building. The burgh, which comprehends the town, contained, in 1841, 102 houses, namely, 98 inhabited, 3 uninhabited, and 1 building; and a population of 464 persons: the whole parish had a population of 1299, including the population of Port Elphinstone (112 persons), which is in this parish, though comprehended in the burgh of Inverury, and the population returned with it. The trade of Kintore is promoted by the Aberdeen Canal, which passes close to the town, and upon which there is a wharf: lime is brought up from Aberdeen, and granite carried down. There are several good shops in the town, and at Port Elphinstone are a number of grain-mills, two saw-mills (one moved by steam, the other by water), and some granaries, timber-yards, and storehouses. The burgh is very antient: tradition states that it originated in the time of Kenneth II., but this is utterly unlikely: there is a charter of confirmation granted by James IV. or V. The earl of Kintore and his ancestors had, before the Burgh Reform Act (which did not affect this burgh), held the provostship for a century and a half, and paid all the burgh expenses. Kintore is a contributory borough to the Elgin district of Parliamentary burghs, and had in 1835-6 a constituency of 35, and in 1839-40 of 36. There are a parochial school and several private schools in the parish: a school at Port Elphinstone has a school-house built by government, but no endowment: in all the schools together there are about 200 scholars, two in thirteen of the whole population. There are two Sunday-schools, one at Kintore and one at Port Elphinstone. There are a circulating library and a savings'-bank at Kintore.

This little place gives the title of earl to a junior branch of the Keith family. The earl was made a baron of the United Kingdom in 1838. Near the town on the south are the remains of Hall-forest Castle, said to have been built by King Robert Bruce, and to have been a hunting-seat of the kings of Scotland: it is a square building of considerable height, and there are traces which show that it was once of larger dimensions.

Peterhead is in the district of Deer, on the east coast, 32 miles north-north-east of Aberdeen. It stands on a peninsula running south-eastward into the North Sea, on the south side of the mouth of the Ugie: the two harbours, the New North Harbour and the South Harbour, are near the south-eastern extremity of the peninsula, in opposite sides of which they are excavated or otherwise formed. The South Harbour is the oldest, having been formed in 1773, according to a plan of Mr. Smeaton, afterwards extended by Mr. Rennie, and covers about six and a half standard acres; the New North Harbour was formed in 1818, from a plan of Mr. Telford, and covers almost eleven acres: both harbours are furnished with quays and protected by piers. The town occupied, in 1840, a site of about seventy acres; and had, in 1841, within the burgh limits (which include the suburb of Ronheads and the village of Buchan haven, both inhabited chiefly by fishermen), 785 houses, namely, 757 inhabited, 21 uninhabited and 7 building: the population of the burgh was 4586, and that of the whole parish (which has an area of above 9000 acres) was 7619. The streets of the town have been much improved of late years, and have side-paths, paved in some parts with dressed granite: they are lighted with gas. The houses are generally of granite, which is quarried near the town. The principal public building is the town-hall. The market-cross is a granite pillar of the Tuscan order. The church (built in 1803) is near the entrance of the town on the west or land side, and has a spire of granite 118 feet high: there is a large Episcopalian chapel (a Gothic building erected in 1814), and there are smaller places of worship for the Associate Seceders, Independents, and Methodists. There is but little manufacture carried on: some woollen cloth and some cordage are made. The trade of the town is considerable: the chief exports are grain, meal, butter, pork, herrings, codfish, pork and eggs: the imports are lime, wool, timber, salt, flour, and general merchandise. A custom-house has been lately established. The number of vessels belonging to the port on the 1st of January, 1837, was 82, with an aggregate tonnage of 11,122 tons. The whale fishery employed, from 1820 to 1825, 15 or 16 vessels belonging to this port, but since 1825 the number has gradually decreased, and in 1836 was only 11. The herring fishery, which has grown up since 1820, has gone on steadily increasing. There is a salmon fishery in the Ugie. The herring and cod and general fishery is also carried on at the village of Boddam, 3 miles distant. Brick-earth is dug near the town, and granite of excellent quality is quarried. There is a weekly market on Friday; and two antient half-yearly markets or fairs. Peterhead is a burgh of barony, erected by charter of the Earl Marischal in A.D. 1593. By the Burgh Reform Act the municipal government is vested in a council of twelve, who choose from their own number a provost, three baillies, and a treasurer. Peterhead is a parliamentary burgh in the Elgin district: the constituency in 1835-6 was 207; in 1839-40 it was 241. There are a parochial school, and an endowed school, called 'the town school,' taught in the town-house, and several private schools; there are several Sabbath-schools which are numerously attended, particularly by females; there are also a 'Reading Society,' with a library of 1500 volumes, a Scientific Association, a news-room, and several charitable societies.

A part of the parish has been formed into a separate parish 'quoad sacra;' connected with the church of which is a congregational library of 240 volumes. Peterhead is frequented as a bathing-place: it has several mineral-springs of some reputation. Near the town are the remains of two antient castles, Ravens'-crag and Boddam: the former is the more antient. The Pretender landed at Peterhead in disguise in the rebellion of 1715.

Charlestown or Charleston, distinguished as Charleston of Aboyne, is in the parish of Aboyne and Glentaner, in the district of Kincardine O'Neil, near the Don, 20½ miles west of Aberdeen. It is a very small place, having, in 1841, 56 houses, namely, 51 inhabited and 5 uninhabited, with a population of 260: the population of the whole parish was 1138. The village has a few shops, a commodious inn, and a post-office: there are five great markets in the year, held on a green near it. The church is about a quarter of a mile west of the village, and will hold above 600 persons. Near it is a suspension-bridge over the Don, erected by the Earl of Aboyne at his own expense, in the place of one destroyed by the great flood in 1829: the suspension part is 230 feet long, and there are two trussed iron arches of 50 and 60 feet span respectively and two stone arches of 20 and 30 feet. The parish school had, in the winter of 1841-2, 140 scholars. There is a pretty extensive parochial library.

Fraserburgh is in the district of Buchan, on the north coast of the county, 42 miles north of Aberdeen, 18 miles north-north-west of Peterhead, and 22 east of Banff, to all which places there are excellent turnpike-roads. The town is built on the western side of the small bay of Fraserburgh, bounded on the south-east by Cairnbulg Point, and on the north-west by Kinnaird's Point. The parish was originally called Philorth, but a town and harbour having been built, and a burgh of regality erected by charter obtained by Sir Alexander Fraser of Philorth, it took from him the name of Fraserburgh. The town consists of streets crossing at right angles, clean, and in good condition. The number of houses in the parish, exclusive of the village of Broadsea, was, in 1841, 725, of which 714 were inhabited, 7 uninhabited, and 4 building; the population was 3289, or including Broadsea 3615. The town was not, in the return, distinguished from the rest of the parish. Many of the houses in the town are comfortable and even elegant. The town-house, the market-cross, and the tolbooth (the last now falling into ruins) were all erected by Sir Alexander Fraser mentioned above. The cross is a stone pillar, 12 feet high, erected on an hexagonal base, and is surmounted by the British arms and the armorial coat of Fraser of Philorth. The parish church is in the middle of the town: it was built in 1802, and will hold 1000 people: it has a spire. There are an Episcopalian chapel and an Independent meeting-house. The harbour is formed by three piers: a north pier 300 yards long, begun in 1807 and finished in 1812; a south pier of the same extent, built under an act obtained in 1818; and a middle pier erected since, broader and 'superior to the other two.' The extent of the harbour is above six Scotch acres; the depth of water at the pier-heads six feet at low-water and twenty feet at high-water of spring-tides. The bay affords good anchorage. There is a lighthouse on Kinnaird's Head. A little rope and sail making is carried on in the town; barley, oats, and potatoes of good quality, cattle, and dried and pickled cod and herrings are exported; and timber, coals, lime, bricks, salt, and general merchandise are imported. Eight vessels of from 45 to 155 tons burden, belong to the port; and there are 220 boats engaged in the herring fishery, which employs 1600 people. This branch of industry was first extensively prosecuted in 1815; it begins in July and lasts till September; and during its continuance the population of the place is augmented by 1200 persons from other parts, and the town and harbour present an aspect of unwonted bustle. Some freestone is quarried in the parish, of which the piers and some of the houses are built; and there are mineral-springs, one of which is in some repute as a tonic. There are in the parish the ruins of two antient chapels, one of which, called 'the College,' belonged to the Cistertian abbey at Deer. There is also at the west end of the town an old quadrangular building of three stories, designed by Sir Alexander Fraser for a college; he had obtained a charter from the crown in 1592, for the institution and endowment of a college and a university; but the plan was never carried into effect. All the proprietors of houses in the parish are feuars of the borough, of which Lord Saltoun is the superior, with the authority of provost, and the right of nominating the council and magistrates with the advice and consent of the existing council. The burgh officers are two baillies, a dean of guild, a treasurer, and seven councillors. There are in the parish a parochial school, with an average attendance of 100 scholars, 20 to 30 of them girls; and several day-schools, chiefly female or dame schools: there are about 500 children at the day-schools, including the parochial; or about one in seven of the whole population; and about 300 attend the Sunday-schools, of which there are eight. There are a savings'-bank and a parochial library.

Huntly is in the district of Strathbogie, on the south-east side of the Deveron or Doveran, in the angle formed by the junction of the Bogie, 38 miles north-west of Aberdeen on the road to Inverness. It is a burgh of barony under the earls (now marquises) of Huntly. The town is surrounded by hills, and consists of streets regularly laid out and lighted with gas, the two principal intersecting each other at right angles, with a square or market-place at the intersection. It had, in 1841, 596 houses, namely, 576 inhabited, 18 uninhabited, and 2 building; with a population of 2731. The population of the whole parish was 3642. The parish church, built in 1805, will accommodate 1800 persons; and a new church, which will hold nearly 1000, was erected in 1840; there are Roman Catholic and Episcopalian chapels, and meeting-houses for Independents and Associate Seceders. There are two good bridges, namely, an antient bridge of one arch, over the Doveran, and a bridge of three arches over the Bogie. Near the town stands the now deserted Huntly Castle, built in 1602, out of the ruins of the more antient Strathbogie Castle adjoining to it. There is also Huntly Lodge, now enlarged to a handsome house, and occupied by the Dowager Duchess of Gordon. There are in or near the town a bleach-field, a tanyard, a distillery, and three banks. There is a weekly market on Thursday. Butter, eggs, cheese, pork, poultry, and game are sent from the town and neighbourhood. There are about 12 yearly fairs or great markets: those at Whitsuntide and Martinmas, for hiring servants, are the largest: the other fairs are for horses, cattle, and other things. There are in the town the parish school, which has about 140 scholars at the most favourable time of the year, the 'new school' connected with the new church, with 128 scholars, an infant-school with 80 scholars, and a sewing-school with 30 scholars; these are all held in a building erected for educational purposes by the Duchess of Gordon. There are besides an excellent girls' boarding-school with 40 pupils, and several other private schools chiefly kept by females. There are about 530 children at school in the best season, or nearly one in five of the population. There are also several Sunday-schools in connexion with the Established churches, or with the Independents and Roman Catholics. The country parts of the parish are not so well provided with schools. There are a farmers' club, under the presidency of the Duke of Richmond, who is proprietor of nearly the whole town, a farmers' agricultural library, an evangelical subscription library, a coffee and reading room supplied with one or two provincial papers, a dispensary (one account says two dispensaries), a savings'-bank, and a friendly society connected with the total abstinence society.

Old Meldrum is in Meldrum parish, in the district of Garioch, 18 miles north-north-west from Aberdeen on the road to Banff. The parish had, in 1841, 427 houses, namely, 420 inhabited, 6 uninhabited, and 1 building; with a population of 1873. The town is not distinguished in the return from the rest of the parish. Old Meldrum was erected into a burgh of barony by charter obtained in 1672, but there are no magistrates or burgh officers now. The town-house and the town-hall are respectable buildings. The parish church is close to the town: it was built in 1710, and has been since enlarged so as to hold 700 persons; but it is still too small for the parish. In or close to the town are an Episcopalian chapel and an Associate Secession meeting-house. There are a distillery and a brewery in the town, and two weaving-shops for cotton goods, rented by manufacturers at Aberdeen, in which some of the young people are employed at hand-loom weaving. There is a second distillery in the parish. There is a good weekly market for provisions, and a corn and cattle market every fortnight in winter and spring. There are a parochial school in the town, and three private schools, one of them for girls, in the parish: a Sunday-school in the town has a small endowment. There is a savings'-bank. On a farm called Chapel House, in the parish, there are the remains of a Roman Catholic chapel standing in a burial-ground, which has only been disused within living memory. The traces of a small Roman camp have been obliterated lately.

Rosehearty, in Pitsligo parish, in the district of Buchan or Deer, is on the northern coast of the county, about 4 miles west of Fraserburgh. It was created a burgh of barony by royal charter in 1681. Mr. Dingwall of Bracklaw and Corsindae is superior, but the burgh has no magistrate or public officer, and the tolbooth has become private property. There is however some property belonging to the burgh, which is managed, with the concurrence of the feuars, by private individuals; and there is a debt of 200*l*. The parish church, built in 1634, has a spire, and will hold about 500 or 600 persons. It is not stated whether it is within the burgh limits: but there is a meeting-house for the Associated Seceders in the burgh. The burgh in 1841 had 188 houses, namely, 182 inhabited, 3 uninhabited, and 3 building; with a population of 750. The population of the whole parish was 1582. There is a good harbour for vessels not exceeding 70 tons. It has 9 feet water in neap and 14 feet in spring tides: and three vessels belong to the port, besides fishing-boats. The herring fishery employed, in 1838, 40 boats with five men each, or four men and a boy, besides seven vessels to attend the fishery. Cod, ling, haddocks, skate, saith, poddlies, and a small black fish called cole, are caught. The fish are sent to London, Edinburgh, or Glasgow. In March several of the fishing-boats resort to the Isle of Tyree in the Hebrides to fish for cod, and sell their cargoes at Glasgow, from whence they bring back coals. Salt and timber are also imported; and grain is exported. A fishing-harbour has been lately formed at Sandhaven in the parish east of the burgh. There is a weekly market at Rosehearty on Saturday, and a post-office, a branch of that at Fraserburgh. The parochial school has a library of 100 volumes connected with it. There are in this parish six other schools (five of them taught by females), with an average of 30 scholars each. There are several friendly societies in the town.

Turriff, in the parish and district of Turriff, is about 11 miles south of Banff, on the Turriff burn, which joins the Doveran. In 1841 it had 312 houses, namely, 306 inhabited and 6 uninhabited; with a population of 1309. The population of the whole parish was 3146. The parish church, a handsome structure, was built in 1794, and has been since enla
The remains of the old church, which was built befor
Reformation, are still standing in the parish burial-ground
near the burial-ground gate are the vaults of an antient t
There are an Episcopalian chapel and an Independent mee
house. A cross of considerable antiquity stands in the
cipal street: it is a stone pillar on a base of circular steps r
to a height of 20 feet from the ground. There are se
considerable mansions in the neighbourhood, especially
gaty Castle and Towie Barclay; and there are two brid
one close to the town, over the Turriff burn, and one over
Doveran, a little distant. Some linen-bleaching is carried
but not so extensively as formerly. There is a small woo
cloth manufacture: some silk and woollen dyeing are do
and some worsted stockings are knitted. There are some
shops. There are three banks, a gas company, and a l
post-office. There are eight yearly fairs for horses, cattle,
sheep; and 'feeing markets' at Whitsuntide and Martin
for hiring servants. Turriff was created a burgh of barony
charter in A.D. 1511, with a grant for markets and fairs.
parochial school has generally more than 100 scholars,
there are several dame or other private schools. There
about 400 children, or one in eight of the population, at sch
There are five Sunday-schools, three in the town and tw
other parts of the parish. There are a parish library with
subscribers and 600 volumes, an agricultural association, a
savings'-bank. The sheriff substitute holds a small debt c
quarterly; and there is a small lock-up house for tempo
confinement. The first blood drawn in the great civil wa
Charles I. was at what is called 'the Trot of Turriff,' w
the Royalist nobles and gentry in 1639 dispersed 'the C
mittee of the tables' assembled in the town.

The following villages may be briefly noticed. Ballate
Glenmuick parish, 41½ miles west of Aberdeen, on the n
bank of the Dee, is of recent origin, and is much resort
on account of the beauty of the situation and the min
springs of Pananick in the neighbourhood: the houses
regularly built and neatly fitted up for lodgers, and amou
in 1841 to 73, namely, 69 inhabited and 4 building;
population was 371. The parish church is in the vill
and there is a post-office. The springs or wells of Pana
about two miles east of the church, are four in number,
chalybeate, stimulant, and tonic: there are lodgings at
wells, also hot, cold, and shower baths. The resort of visit
in the summer is very considerable, and it is at present t
most fashionable bathing-place in the north of Scotland. T
stone bridges of five arches, over the Dee, have been carri
away within the last half-century by the floods to which th
river is subject; the first was destroyed in 1799, the secon
in the great floods of 1829: at present there is a neat substantial wooden bridge of four arches. Boddam or Boddan, 3 miles south of Peterhead and in Peterhead parish, in the district of Buchan, is near Buchan-head, on which there is a lighthouse of granite 118 feet high. It was built A.D. 1824, and has a flashing light. This lighthouse is on an island connected with the mainland by a beach of round stones, separating the north and south boat-harbours of Boddam: the south harbour will receive ships of a moderate draught of water. The population (526 in 1841) of Boddam consists chiefly of fishermen and their families. Newburgh, in Foveran parish, in the district of Ellon, 10 miles north of Aberdeen, in 1841 had 94 houses (namely, 91 inhabited, 2 uninhabited, and 1 building), and a population of 393. The New Statistical Account of Scotland makes the houses 120 and the population 450. Several of the houses are substantial and commodious, and the appearance of the place is much improved. The village stands on the burn of Foveran near its junction with the Ythan, the mouth of which forms the port of Newburgh, to which eight vessels, with an aggregate tonnage of 646 tons, belong. They import coal, lime, timber, and bones; and export grain and cattle, the latter to London. There is some fishing. There are a bone-mill, several granaries, a savings'-bank, and a shipmasters' friendly society. Newbyth or New Byth, in the parish of King Edward and the district of Turriff, 13 miles south-east of Banff, consists of two streets crossing at right angles. It is the centre of a quoad sacra parish, which in 1841 had 326 houses, namely, 310 inhabited, 10 uninhabited, and 6 building; with a population of 1369, of whom about 300 are in the village. There are in the village a chapel of the establishment, a subscription library, two inns, and a distillery: there are three fairs in the year. Strichen, Mormond, and New Leeds are in the parish of Strichen, in the district of Buchan. Strichen is well built, and has a neat

town-house, a commodious church, a branch bank, a savings' bank, and a post-office. There are five yearly fairs; one was established for the sale of yarn, but the cultivation of flax and the sale of yarn, formerly extensive, have much declined. Mormond was laid out in 1764, and is regularly built, with a number of good, commodious, slated houses. Weaving is carried on to some extent. The population of New Leeds in 1841 was 203; that of the other villages was not distinguished in the return. Stuartfield, or Stewartfield, in the parish of Old Deer, in the district of Buchan, had, in 1841, 182 houses, namely, 174 inhabited and 8 uninhabited; and a population of 614. Several persons are employed in the manufacture of linen yarn in the village; and in it or in other parts of the parish are lint-mills, mills for making woollen cloth and yarn for stockings, a dye-house, a fulling-mill, and a savings'-bank: there are five fairs in the year, two of them horse and cattle fairs of some consequence, the other three are unimportant.

Divisions for Ecclesiastical and Legal Purposes.—The county is for the most part included in the jurisdiction of the Synod of Aberdeen, which comprehends, in addition, nearly the whole of Banffshire and part of Kincardineshire. The Synod of Aberdeen comprehends the following eight presbyteries: Aberdeen, which includes that portion of Kincardineshire that is under the synod; Alford, which extends into Banffshire; Deer, Ellon, Fordyce, which last is wholly in Banffshire; Garioch, Kincardine O'Neil, which extends into Kincardineshire, and Turriff. The Presbytery of Strathbogie, which is under the Synod of Moray, is partly in Aberdeenshire, partly in Banffshire and Elgin or Morayshire. The number of parishes wholly or partly in this county according to the Population Returns of 1841 is 90. These are parishes both for ecclesiastical and civil purposes. There are besides 14 'quoad sacra' parishes, that is, districts dismembered from the above, and constituted distinct parishes for ecclesiastical purposes alone; 10 of these quoad sacra parishes have been formed in the city of Aberdeen. Dissenters from the establishment are found chiefly in and about Aberdeen, and in the district and presbytery of Deer or Buchan; in other parts they are not numerous; they consist of Associate or other seceding Presbyterians, Episcopalians, Independents, and a few Roman Catholics and Unitarians, the last in the city of Aberdeen, where they have a place of worship.

There are two universities, namely, King's College in Old Aberdeen, founded in the fifteenth century, by Bishop Elphinstone; and Marischal College in New Aberdeen, founded by George Keith, fifth Earl Marischal, in the sixteenth century. [ABERDEEN, P. C.] The shire is well supplied with schools: nearly two hundred are enumerated in the table given at the end of the county in the New Statistical Account; but this amount is far below the truth, as the whole city of Aberdeen, and about twenty-six parishes in other parts, are omitted in it.

There are a county prison and a bridewell at Aberdeen. There are small burgh prisons at Old Aberdeen, Old Meldrum, Inverury, Kintore, Peterhead, and Fraserburgh; but these are used only occasionally and for very brief confinement. There is a new prison at Peterhead, which town is the seat of a sheriff court; but the prison had not been completed at the time of the Fourth Report of the Board of Directors of Prisons, presented to parliament in 1843. It was then in the contemplation of the Board to provide small prisons at Fraserburgh, Huntly, and Tarland, as the small burgh prisons were not under their direction. The gaol of Aberdeen is built in a substantial manner and in a healthy situation; it is secure, clean, well ventilated, and dry: it contained in 1836 ten day-rooms and sixty cells. The discipline and management at the time of the First Report of the Inspectors of Prisons (1836) were not satisfactory; but considerable changes have taken place since then, and the separate system, for which the building affords opportunity, has been carried out successfully. The bridewell of Aberdeen is a substantial building, in an apparently healthy site; it affords a sufficient number of cells for separate confinement, but the construction of the cells is not such as to render the separation perfect. The management at the time of the Prison Inspectors' Second Report (1837) was decidedly good.

The amount of crime in Aberdeenshire is less in proportion to the population than in other districts, and, notwithstanding the great increase of population, there are fewer cases of atrocious crime, especially of murder, than formerly. The uttering of forged bank-notes has also diminished; but the cases of bastardy and of robberies committed by farm servants on each other had increased. Drunkenness, one of the great causes of crime, is believed not to have increased in proportion to the population, though it is still prevalent. The police about Aberdeen has been much improved.

(*Reports of Inspectors of Prisons*, especially *First* and *Second*, and of *the Board of Directors of Prisons.*)

The county of Aberdeen returns one member to Parliament, The number of electors of all qualifications was, in 1835-36, 2986; in 1839-40, 3181. The city of Aberdeen returns one member; the constituency in 1835-36 consisted of 2242; in 1839-40, of 2189. Peterhead, Inverury, and Kintore are included in the Elgin district of burghs, which returns one member; the other burghs of the district are Elgin, Cullen, and Banff. The constituency has been already given in our notice of the burghs.

History and Antiquities.—At the earliest historical period Aberdeenshire was occupied by the Taezali (Ταίζαλοι) of Ptolemy. The promontory of the Taezali (Ταιζάλων ἄκρον) of the same writer may be probably identified with Kinnaird's-head near Fraserburgh; his rivers Celnius (Κέλνιος) and Deva (Δηούα), with the Doveran and Dee respectively; and his city Devana (Δηουάνα) has been identified by General Roy with Old Aberdeen, and by others with Norman Dykes on the Dee, a few miles above Aberdeen. The south-western part of the county was probably included in the territory of the Vacomagi (Οὐακομάγοι) of Ptolemy; as Tamea (Τάμεια), one of the towns which he ascribes to them, is by some identified with Castletown of Braemar. The Ituna of Richard of Cirencester may be identified with the Ythan, and his position Ad Itunam with some place on its banks.

Of the most antient period of its history Aberdeenshire contains various monuments; such as cairns, barrows, Druidical stones, and the structures sometimes called Picts' houses. There are also some antient camps, some of which are supposed to be Roman. A singular monument called the Maiden Stone is found in Chapel of Garioch parish. It is a stone pillar, ten feet above ground, and supposed to be imbedded six feet below the surface; it is nearly three feet broad and one thick, marked with hieroglyphic or other characters, supposed to be Danish. Its name is connected with a tradition which ascribes the origin of the monument to a love tragedy of the middle ages. There are in the parish of Aboyne and Glentaner remains of a 'Pict's house,' a circular enclosure of stones regularly laid without cement, and partly imbedded in the rock. The enclosure, which is 83 feet in diameter, is on the top of a hill called Knockbeg: this monument is connected with others of a similar character by two parallel dykes forming an enclosed way or avenue, the main line of which may be traced for nearly fifty miles, near the north bank of the Dee; some branches diverge in a direction traversing the river and the Grampian Mountains.

The principal events of the middle ages and of later days were—the battle of Cruden, in the beginning of the eleventh century, between the Scots under Malcolm II. and the Danes under Canute, afterwards king of England. In the early part of the fourteenth century King Robert Bruce marched into Aberdeenshire to chastise Comyn, or Cumin, earl of Buchan, by whom he was surprised when sick in his camp near Inverury, but whom he defeated, and whose country (Buchan) he subjected to the most fearful devastation. In 1411, during the captivity of King James I. and the regency of the duke of Albany, the bloody battle of Harlaw, in Chapel of Garioch parish, was fought between 10,000 highlanders, under Donald, Lord of the Isles, and the royal forces (lowlanders), under the earl of Mar, in which Donald was completely defeated. In the great civil war of Charles I., A.D. 1644, Montrose defeated the Covenanters under Lord Burley, not far from Aberdeen, which he entered. Monk occupied Aberdeen in 1651; and the troops of the Pretender, under Lord Lewis Gordon, occupied it and levied contributions on it in 1745. A detachment of the royal forces, sent from the north by Lord Loudoun to relieve the town, was defeated by the rebels at Inverury in the latter part of that year. The duke of Cumberland was at Aberdeen next year, when he marched northward previous to the battle of Culloden.

The principal memorials of the middle ages are the ruins of feudal castles. On the north coast, between Fraserburgh and Banff, in the parish of Aberdour, are the remains of the antient castle of Dundargue, situated on a red-sandstone rock which rises from the sea to the height of above 60 feet, and is connected with the mainland at high-water only by a narrow ledge of rock. Here Henry de Beaumont, the English earl of Buchan, was besieged by Sir Andrew Murray, regent of Scotland during the captivity of King David II. On the same coast, near Banff, in the parish of King Edward, are the remains of Ken-Edgar Castle, once the seat of the Comyns, or Cumins, earls of Buchan. Pitsligo and Pitullie castles are both on the coast near Fraserburgh. Craigston Castle, in the same neighbourhood, built in the seventeenth century by one of the Urquharts of Cromarty, is a fine old building in good preservation. Fedderatt Castle, near New Deer, was a fortress of considerable strength. On the eastern coast are the ruins of Slains Castle, once the seat of the earls of Errol, demolished in 1594, after the rebellion of the earl of Huntly, by order of James VI.; and on the north-eastern bank of the Ythan stands Fyvie Castle, one of the finest Gothic edifices in the county. There are numerous other ruins of antient castles or towers. Huntly Castle has been noticed. The monastic and other ecclesiastical remains are very few. Near the village of Old Deer are the ruins of a Cistertian abbey, built in the beginning of the thirteenth century, by one of the Comyns, earls of Buchan. The remains show that it has been a very extensive building. In Fyvie parish are the remains of a priory of Tyronenses, said to have been founded by Fergus, earl of Buchan, near the close of the twelfth century.

(*New Statistical Account of Scotland*; *Gazetteer of Scotland*, published by Fullarton and Co., of Glasgow; *Parliamentary Papers.*)

ABINGER, LORD. [Scarlett, James.]

ABLAIKIT (*i. e.* the Convent of Ablai), the name of some ruins in the steppe of the Middle Horde of the Kirghis, about 50 miles from the towns of Buchtarminskaja and Ust-Kamenogorskaja, both built on the banks of the upper course of the river Irtish. The place is in 49° 20′ N. lat. and 83° 5′ E. long. These ruins are situated near the base of the range of mountains called the Ablaikit Mountains, which rise about 3000 feet above their base; and in the vicinity there are very fine and extensive pasture-grounds, which however at present are little used. In the beginning of the last century, when the Russians were erecting the fortress of Ust-Kamenogorskaja, some of their people fell in unexpectedly with these ruins. They consisted of four buildings of different sizes. The largest was an oblong square, the longer side being 500 fathoms, and the shortest about half as much. This is considered to have been the convent, in which the priests of the Buddhist religion were lodged. A smaller building had evidently been a temple, as was proved by a great number of idols, pictures on the walls, and manuscripts, which were found there. The fragments of the idols showed clearly that they had reference to the religion of Buddha. Among them were also found some wooden boards, with raised figures on them resembling some letters in the manuscripts: whence it was concluded that they had been used for printing. Some of the manuscripts found in the temple were written with golden letters on black paper, and were of great beauty; others were written on common paper, or on the interior bark of the beech-tree. Some of these manuscripts were sent to Peter the Great, but without any information respecting the place where they had been found, and he wished to know their contents. Not finding in his dominions a person who was able to understand them, he sent them to Paris, whence he soon obtained a translation, or rather a paraphrase, which however, on closer examination, turned out to be a fabrication, and it was evident that the translator did not understand one word of the language in which they were written. It was afterwards ascertained that the manuscripts were written in the Tangut language, and referred to the tenets of the Buddhist religion. The third building was rather small, and appeared to have been the printing-establishment. The fourth was of a diminutive size, and evidently had been used as a kitchen. All these buildings, though they had no great architectural beauty, were very regular, and constructed of excellent bricks. On two sides the buildings were protected by almost perpendicular rocks, and on the two other sides by a wall about ten feet high and eight feet thick. This was also of brick, but at the time when the ruins were discovered it was in a state of decay. The place thus enclosed was very spacious, and evidently destined to receive a great number of tents or temporary huts. It was ascertained that this place had been built about the middle of the seventeenth century, by Ablai, one of the khans of the Songares, a great branch of the Mongols; and apparently he had destined it to be one of his temporary residences. He soon afterwards (1670) was engaged in a war with the Galdan, the khan of the Proper Oloth [Songaria, P. C.], in which he was unsuccessful, and by which he was at last obliged to abandon his country precipitously. The state of the buildings, which still contained much furniture, evidently showed that they had been suddenly abandoned. Ablai and those who still remained faithful to him went westward to the banks of the Ural and Wolga rivers, where he frequently surprised and plundered the Calmucks, until he was taken prisoner, and brought to Astrakhan, where he lived to an old age. Modern travellers who have visited these ruins have found them in a state of rapid decay.

(Müller, *Sammlung Russischer Geschichten*; Fischer, *Siberische Geschichte*; Von Ledebour, *Reisen nach dem Altai Gebirge*; Ritter, *Erdkunde von Asien*, vol. i.)

ABORTION. [Infanticide, P. C., p. 469.]

ABSENTEE. The P. C. contains under this head a statement of the arguments which have been urged in support of the opinion that absenteeism is no injury to the country from which the rent or income of the absentee is derived. It must be admitted that the evil is not so serious as many people suppose, and if we take everything into the account, it may be that the evil is inconsiderable. So complicated are the relations of modern society, that any restraint upon the mode in which a man spends his income would probably do much more mischief, even to the country from which an absentee derives his income, than the absenteeism itself does, whatever that amount of mischief may be.

Still, as a mere scientific question, the opinion of those who maintain that absenteeism is no loss to the country of the absentee, requires some limitation. It is easy to show that its direct effect is to diminish accumulation in the country of the absentee, and it is not easy to show that this direct effect is counteracted to its full amount in any indirect way.

It cannot be proved, as it has been maintained, that the absentee's consumption of foreign goods abroad is equivalent to an importation of foreign goods into England or any other country from which he derives his income, whatever it may be, and that such consumption produces a correspondent exportation of English goods to the foreigner. The absentee is enabled to receive his rent abroad because a foreign trade already exists; and it is not necessary, in order that he shall be able to receive his rent in money abroad, that a trade should exist between his native country and the country of his residence. There must be a foreign trade somewhere, in order that he may receive his income abroad in money, but a man may live in a part of Europe which has no trade with Great Britain, and he will receive his money by an indirect route, and by means of the trade of England with some other foreign country. But it does not follow that the foreign trade of Great Britain is increased by the consumption of an absentee abroad so as to produce an exportation of English goods to the amount of his foreign consumption. And if we admit that the absentee's consumption of foreign goods abroad produces all the effect that has been attributed to it, this will not remove the whole difficulty. Many of the things which he consumes abroad are not the peculiar products of the foreign country, which he would or might consume whether he was in England or that foreign country. He consumes and uses many things abroad which he would consume or use in England, and which must be furnished by the country in which he is residing.

Accumulation, or the increase of wealth in a country, can only arise from savings or from profits. All persons who supply the demands of others obtain a profit by the transaction; at least the obtaining of a profit is the object with which a demand is supplied, and the actual obtaining of a profit is the condition without which a demand cannot be permanently supplied. All persons who have an income to spend may in one sense consume it unproductively, as it is termed, that is, the income may be spent merely for the purpose of enjoyment, and not for the purpose of profitable production. But no income which is received in money can be spent without indirectly causing profitable production, for every person who supplies the wants of the spender of the income receives a portion of the spender's money, part of which portion is the profit of the supplier. If this income is spent in France or in Belgium, persons in France or in Belgium derive a profit from supplying the absentee, and this profit enables them to accumulate. What is thus spent in France or in Belgium produces a profit to a Frenchman or a Belgian, and enables him to accumulate, and this profit is something taken from the profits of those who would supply the demands of the consumer in England. If all the persons who come to settle in London, and require commodious houses, servants, meat, fruits, vegetables, and so forth were to settle at Brussels, the houses which are now built in London, and the grounds which are employed as kitchen-gardens round the metropolis, would not exist, and the profit derived from this employment of capital would not exist. It would be transferred to Brussels and to Belgian capitalists. This would be the immediate effect of the wealthy residents in London removing to Brussels. The removal of these residents to Brussels would be the withdrawal of one of the means of profitably employing capital, and would so far be a loss to the national wealth. Nor can it be shown that the capital which is now employed in and about London in building houses and cultivating garden-ground could be employed with equal profit in some other way; for to assert this would be equivalent to asserting that it is always possible to employ capital under all circumstances in a manner equally profitable. It may be rejoined, that if all or most of the wealthy residents of London removed to Brussels, English capital would be required in order to accommodate them with houses, and to provide some of their necessaries. This may be admitted, and yet it does not remove all the difficulty, for if the residents were to remove to various towns of Italy, the employment of English capital would not be required to the same degree as if they were all to remove to one place, such as Brussels.

But this is only part of the question. There are numerous sources of profit arising from the supply of the ordinary wants of a man and his family, which accrue to the people of the place in which a man fixes his residence: these are the ordinary retail profits of trade. This is obvious in the case of a number of families quitting a provincial town to reside in London: the provincial town decays, and that source of profit which is derived from supplying the wants of the families is transferred to the tradesmen of their new place of residence. This, which is true as to one place in England compared with another, is equally true as to England compared with Belgium or France. If we take into account merely the amount of wages which a large body of absentees must pay to their domestic servants, this will form a very considerable sum. The savings of domestic servants in England from their wages are invested in various ways; and such savings are no small part of the whole amount of the deposits in savings' banks. It will hardly be maintained that all those who would be employed as domestic servants in London, if the absentees in France were to come to live in London, are employed with equal profit to themselves while the absentees are abroad. London is supplied with domestic servants from the country, many of whom would be living at home and doing nothing, if there were no demand for their services in London; and everything that diminishes such demand, diminishes the savings of a class whose accumulated earnings form a part of the productive capital of Great Britain.

Those then who maintain that absenteeism has no effect on the wealth of the country from which the absentee derives his income, maintain a proposition which is untrue. Those who maintain that the amount which a man spends in a foreign country is so much clear loss to the country of the absentee, are also mistaken. There are many ways in which the loss is indirectly made up; but whatever may be its amount, it would be unwise to check absenteeism by any direct means, and it is not easy to see how it can be checked indirectly in any way that will produce good.

Since writing this we have seen 'Five Lectures on Political Economy,' delivered before the University of Dublin, in Michaelmas Term, 1843, by J. A. Lawson, LL.B., in which the subject of absenteeism is discussed, though from a somewhat different point of view. Mr. Lawson does not agree with those economists who think that a country can sustain no injury from the residence abroad of landlords and other proprietors of revenue. He is of opinion that, so far at least as Ireland is concerned, absenteeism is an economical evil. His views on the effects of absenteeism are contained in Lecture V., pp. 122-131.

ABSORPTION OF LIGHT is that quality in an imperfectly transparent body, or at a polished surface, by which some portion of an incident pencil of light is retained within the body, while the rest is either transmitted through it or reflected from it.

The different colours exhibited by bodies in ordinary light are caused by the transmission, or reflexion, of such of the rays as give rise to the perceptions of the colours, the other rays being absorbed. A body absorbing all the light which falls upon it would appear to be entirely black, or would be invisible; while a body reflecting unchanged all the light incident upon it would seem to be entirely white. No bodies in nature possess however the qualities of absorption or reflexion perfectly; for the most opaque bodies known permit some light to pass through them, and the blackest permit some to be reflected from them: while those which appear to be the most white, or the most transparent, absorb much of that which falls upon or enters them; and the same body, when in different states, absorbs or transmits light with different degrees of facility.

When light enters into a homogeneous medium, it is probable that its intensities, at depths which are in an arithmetical progression from the surface of incidence, decrease in a geometrical progression; for it is reasonable to imagine that, in indefinitely thin portions, of equal depths perpendicularly to that surface, the quantities absorbed will bear nearly a constant ratio to those which enter. With this assumption, let a represent the quantity of light which falls on the surface of a body, and let the quantity absorbed be $\frac{1}{n}$th of that which enters; then, $\frac{1}{n}a$ being absorbed in the first portion, the quantity which emerges from thence will be represented by $a-\frac{1}{n}a$, or $\frac{n-1}{n}a$. Again, $\frac{1}{n}$th of this quantity being absorbed in the second portion, there will emerge from thence a quantity represented by $\frac{n-1}{n}a-\frac{1}{n}\cdot\frac{n-1}{n}a$, or $\left(\frac{n-1}{n}\right)^2 a$, and so on, the emerging quantities being thus represented by geometrical progression whose common ratio is $\frac{n-1}{n}$. It may readily therefore be conceived why, if a portion of any medium be rendered extremly thin, like foam on the surface of a liquid, so little light may be absorbed in passing through it as to cause it to appear colourless, while the quantity which emerges from a thick mass of the like medium may be scarcely sensible.

Some transparent media allow the rays of certain colours in an incident pencil of compounded light to pass through them more freely than others: thus, in proportion as the thicknesses of the media are greater, the rays transmitted through green glass become more homogeneous; and those which pass through glass which, of a certain thickness, is yellow, appear, as the plate is successively thicker, to be green, brown, and red.

In POLARIZATION OF LIGHT, P. C., it has been stated that when common light passes perpendicularly through a plate of tourmaline (a doubly refracting crystal) whose surfaces are parallel to the geometrical axis of the natural prism, one of its refracted pencils is partly and the other almost wholly absorbed; and it follows that the emergent pencil has less than half the intensity of that which is incident on the plate. Dr. Wollaston was probably the first who discovered (*Phil. Trans.* 1804) that the light transmitted in a direction parallel to the axis of the crystal had a colour different from that of the light which was transmitted perpendicularly to that axis; and M. Biot (*Traité de Physique*, tom. iv. 1816), having inferred from the *ordinary* image of a white object, transmitted through the thinner part of a prism of tourmaline, being greenish, while the *extraordinary* image is white, that the difference of colour did not arise from the different coloured rays being unequally divided between the two pencils, since then the colours of the two images should be complementary to one another, concluded that the blue and violet rays which are wanting in the ordinary image are more easily absorbed in the crystal when they are polarized parallel to its axis than when polarized perpendicularly to it. Previously however to the publication of Biot's work, Dr. (Sir David) Brewster had discovered like phenomena in plates of agate, in mica, and in carbonate of barytes. (*Phil. Trans.* 1814.)

The quantity of light absorbed in tourmaline depends upon the thickness of the plate, and it is found that the absorption takes place gradually, as the pencil passes through; for if a plate of tourmaline be ground to the form of a wedge, whose sides make with each other a very acute angle, and whose edge is parallel to the axis of the crystal, on looking through the sides of the wedge at a candle it is observed that, near the edge, the images produced, both by the ordinary and the extraordinary refraction, have nearly the same degree of brightness and tint: then, on moving the wedge so as gradually to bring the thicker part between the eye and the candle, the ordinary image diminishes as gradually in intensity, and at length becomes extremely faint; while the extraordinary image increases in brightness and in the depth of its tint. Sir David Brewster has discovered that a like property exists in different degrees in most of the doubly refracting crystals. (*Phil. Trans.* 1819.)

The oxides on the surfaces of metals consisting, according to the supposition of Newton, of glassy films, it should follow that light falling on such media at particular angles of incidence must, in being reflected from thence, become polarized; while that which, after passing through the film, is reflected from the metal, has little or none of that quality: this is found to be the fact; and to the absorption caused by the light being polarized in the plane of reflexion, or perpendicularly to it, Sir David Brewster ascribes the blue colour of a pencil of common light which has been reflected successively between two plates of indigo-coloured steel, and the bright yellow tint of that which has been reflected from steel of a straw colour; the red rays having been absorbed in the one case, and the blue rays in the other.

Sir David Brewster has also ascertained that the proportions of different coloured rays which are absorbed in certain media depend on the temperature of the latter. In general the tints gradually increase in intensity by the application of heat, and return to their original state when the body is cooled. Some glasses, he observes, change from red to green in the former case, and again become red in the latter; the blue rays, which were capable of being transmitted in the heated state of the glass, being absorbed when the latter was cold. The same philosopher has however found that, in some doubly refracting crystals, heat produces permanent changes in the degrees of absorption to which the two pencils of light are subject. Several crystals of topaz in which, when cold, the absorption of both pencils was alike, acquired, on being heated, the property of absorbing the two pencils unequally; and he possessed some in which, when cold, the extraordinary pencil was yellow, and the other of a pink colour, which, on being subject to a red heat, became colourless. In cooling, the yellow of the former pencil was entirely absorbed; while the pink of the latter was but little changed, and the pink tint thus alone remaining, could not be removed even by the application of the most intense heat.

Bodies which absorb light become heated by the absorption; and, with a given quantity of light, the temperature of a body is said to be nearly proportional to its absorbing power.

ABSTRACT OF TITLE. [Vendor and Purchaser, P. C., p. 204.]

ABSTRACTION AND ABSORPTION OF HEAT is that power by which caloric, or heat, is made to pass from any body to whatever surrounds it, or to any conducting substance with which it is in contact, it being understood that the temperature of the medium, or of the substance in contact, is lower than that of the body from which either of these receives the heat. The abstraction may take place either by radiation from the surface of the heated body, or by an immediate communication between the particles of caloric and those of the bodies by which it is given and received; and the freedom with which the heat is propagated in the body receiving it is designated the conducting power of that body.

The cause of this power is involved in obscurity, or rather, is quite unknown. It has been supposed that the particles of caloric mutually repel each other, and that an attraction exists between these and the particles of the body into which they enter; but it may also be conceived that the particles of caloric, on approaching those of a body whose temperature is lower than that of the body which is the source of heat, impart to them some of their own properties; that these thereby acquire the power of acting in a similar manner on those which are immediately beyond them, the last on others more remote, and so on. Whatever be the cause, it was a principle assumed by Newton, that, within any short interval of time, as one second, the heat lost by a body and acquired by one which is in contact with it, is in a constant ratio to the excess of the temperature of the former body above that of the latter at the commencement of the interval; and if the law were strictly correct, it would follow that, when a body is hotter than the surrounding air, the quantities of caloric abstracted by radiation at the end of equal intervals of time must constitute a decreasing geometrical progression. For an outline of the law by which heat is conceived to be distributed in conducting bodies, see Heat, P. C., p. 88.

The heat emitted by bodies depends in part on the nature of their surfaces; such surfaces as have a certain degree of roughness allow it to pass off more abundantly than those which are smooth or polished; and the experiments of M. Biot show that the propagation of caloric along a rod of iron does not extend to a distance from the heated body greater than about three feet and a half, before it becomes inappreciable by the thermometer. The conducting power differs however in different substances; and, among metals, that which possesses it in the highest degree is silver: below this, in order, are copper, brass, platinum, iron, tin, zinc, and lead. Among solid bodies, the worst conductors are stones, earthenware, and glass. The conducting power of gold is not well known: by Franklin it was found to be less than that of silver and copper; while, from the experiments of Despretz (*Annales de Chimie*, &c. xxxvi.), it appears to be higher than that of any other metal. Count Rumford has proved that the imperfection of the power in solid bodies depends in a great measure on the quantities of air contained within their interstices. He moreover ascertained by experiment that lint, sheep's wool, raw silk, beaver's fur, and hare's fur, were successively lower than each other in conducting power.

Liquids are very imperfect conductors, yet heat passes through them with considerable rapidity. This arises from the freedom with which the particles of a liquid move among one another, and from their expansion by heat, in consequence of which they become lighter; thus, being easily displaced by the colder particles about them, they rapidly carry with them the caloric which they have received from their contact with a body of higher temperature. Count Rumford found that, on mixing with water different substances by which its fluidity, or the freedom of motion among its particles, was diminished, the velocity with which the heat was propagated through it became less; and the retardation increased as the motion of the particles of liquid was more impeded. For reasons similar to those which have been mentioned, heat is rapidly transmitted through the atmosphere and other aëriform fluids, though these, as conductors, are probably less perfect than liquids, and far less than solid bodies.

The experiments of Sir David Leslie established the fact that surfaces from which heat radiates with the greatest freedom absorb it most readily, but the late Dr. Ritchie contrived a species of differential thermometer from which, by direct experiment, he was enabled to prove that the power of radiation from any surface is exactly equal to that of absorption at the same surface. A hollow air-tight cylinder of tin, having one half of its exterior surface bright and the other covered with lampblack, was fixed in a vertical position at each extremity of a bent glass tube containing a coloured spirit; and midway between these was placed a vessel similar to the others, and like them coated on half its surface. When the instrument was to be used, the middle vessel was filled with boiling water; then the bright side of one of the first-mentioned cylinders being turned towards the coated side of that which contained the water, while the coated side of the other was turned towards the bright side of the latter, the rarefaction of the air within the cylinders at the extremities of the tube, in consequence of the heat absorbed by them, was proved to be equal by the coloured spirit remaining stationary in the tube. (*Journal of the R. Inst.* No. V. December, 1831.) It is evident, here, that if the quantity of heat which radiated from the bright side of the middle cylinder were represented by $\frac{1}{n}$th of that which issued from the coated side; the bright side of the cylinder at one extremity of the tube absorbed $\frac{1}{n}$th of the latter quantity, while the coated side of the cylinder at the other extremity absorbed all the former, that is, an equal quantity.

ABUTMENT, in machinery, is a term applied to a fixed point from which resistance or re-action is obtained. In an ordinary steam-engine, for example, each end of the cylinder acts alternately as an abutment for the force of the steam, which, being unable to expand itself in the direction of the fixed obstacle, *i. e.* the end of the cylinder, expands the whole of its elastic force in the opposite direction, against the moveable obstacle, or piston. In like way the breech of a gun forms an abutment for the expansive force of the ignited powder; although in this case, the abutment not being absolutely a fixed point, its recoil occasions some loss of power. Even a rotatory steam-engine, with a continuous circular action, must have an abutment to render the force of the steam effective, though in the primitive rotatory steam-engine of Hero of Alexandria, which is described by Lardner and most writers on the history of the steam-engine, especially by Stuart (who, in his 'Historical and Descriptive Anecdotes of Steam-engines,' p. 12, quotes the original account from 'Heronis Spiritualium Liber a Commandino,' Amst. 1680, p. 66), and in some modern machines on the same principle, the air is made to supply the necessary resistance, and therefore may be termed the abutment of the machine. Springs, whether used to impel machinery, as in the case of a watch, or to measure or control force, as in the various contrivances alluded to under Spring-Balance, P. C., p. 385, must have their abutments or points of resistance; as also must all mechanical combinations in which power is transmitted by means of screws, of which it is sufficient to cite as an example the nut in the fixed head of an ordinary screw-press. [Screw-Press, P. C., p. 111.] In all these cases an analogy may be traced with the use of the term in architecture, explained under Abutment, P. C., p. 51. With a similar meaning the name is applied in carpentry to a joint in which two pieces of timber meet so that the fibres of one piece run in a direction oblique or perpendicular to the joint, and those of the other parallel with it.

ABYDE'NUS (Ἀβυδηνός), also called Abidenus by Eusebius, a Greek historian who is known to us only as the author of a history of Chaldæa, or, as it is commonly called, of Assyria (Ἀσσυριακά), which is lost, with the exception of some fragments preserved in Eusebius, Cyrillus, Syncellus, and Moses of Chorene. From the manner in which these writers mention Abydenus, we must infer that he was an historian of considerable authority. The time at which he lived is not certain: he must however belong to a later period than Berosus, who lived about B.C. 250; for in one of the fragments still extant, Abydenus mentions Berosus among his authorities. The fragments of the history of Abydenus are collected in Scaliger's work, 'De Emendatione Temporum,' and more completely in J. D. G. Richter, 'Berosi Chaldaei Historiae quæ supersunt,' &c., Leipzig, 1825, 8vo. p. 38, &c. and p. 85, &c.

ABYSSINIA. Since this article was written in the P. C., Abyssinia has been visited by many Europeans, who have entered it partly by the road previously known, which leads from the Red Sea at Massówa to the table-land of Tigré, and partly from Zeila and Tajurrah, on the gulf of Aden. From the gulf of Aden the route has been to Shoa, which route was pointed out in this work twelve years ago as that by which the southern parts of Abyssinia might be reached without much risk [Abyssinia, P. C., p. 57]; and so it has turned out. The accounts of these travellers have thrown a new light on the physical geography of this country, and though there are some large portions which have not been visited, we can now form a tolerably correct idea of the great natural features of all this country.

Abyssinia is a large tract in Eastern Africa. The greater part of it is drained by the principal branches of the Nile. It lies between 8° 30′ and 15° 40′ N. lat. and between 35° and 42° E. long.

Abyssinia is an elevated table-land. The greater part of it is more elevated above the sea than the general level of the table-land of Anahuac in Mexico. The north-eastern edge of the table-land is directed towards the Red Sea, and is from 30 to 60 miles from its shores. Those who navigate that sea observe an apparently uninterrupted chain of high mountains from the harbour of Massówa (15° 40′ N. lat.) to Cape Rackmah (13° 40′ N. lat.). These mountains form the descent of the table-land to the flat country on the Red Sea. Isolated peaks are also seen from Cape Rackmah to the Straits of Bab-el-mandeb, but they appear to belong to a ridge which descends on both sides to a low country. From Cape Rackmah the edge of the table-land runs westward, but we are not acquainted with its actual position, as the countries through which it runs are inhabited by tribes which are among the most inhospitable in Northern Africa. In the vicinity of Lake Haik (near 11° 25′ N. lat. and 40° E. long.) the edge of the table-land runs south and north. In these parts however it is not so steep as along the Red Sea, but rises with a gentle acclivity over a considerable tract until it reaches the watershed between the rivers that flow eastward to the Hawásh and those that run westward to the Abái. From the Lake Haik it runs nearly due south, and becomes steeper as it proceeds in that direction, until it terminates near 9° N. lat., about 30 miles from Ankóbar, at some distance from the banks of the river Hawásh in the mountains of Bulga. The wide and level valley through which the Hawásh flows may be considered as lying at the base of the table-land on the south. At the ford of Melki Kuya, where the river is crossed by the road leading from Tajurrah to Ankóbar, its level is about 2200 feet above the sea. As its course is not rapid, it is probable that the swamps in which the Hawásh originates are not more than 5000 feet above the sea. From the valley of the Hawásh the country rises gradually to a ridge which may be between 7000 and 8000 feet above the sea, and constitutes in these parts the edge of the table-land. It runs from the mountains of Bulga westward to the sources of the Hawásh. West of the sources of the Hawásh there are tracts with which we are not acquainted. In these parts the table-land of Abyssinia appears to be connected with the elevated but unknown region of Inner Africa.

On the east of the table-land runs the Bahr-el-Azrek from south to north. The country on its eastern banks and to a great distance from the river is a dead flat and only slightly elevated above the bed of the river. As the river in these parts is hardly more than 1200 feet, certainly not 1500 feet, above the sea-level, it is probable that the edge of the table-land is a great distance from the river, probably near 36° E. long., and as no high range appears to exist in these parts, the country probably rises very slowly, until it attains an elevation of about 7000 feet, about 40 or 50 miles west of Lake Tzana or Zana. It is not possible to determine the termination of the table-land on the north-west. In this direction, according to all accounts, it falls off in inclined plains of immense extent to the north-west and west, until it terminates on the banks of the Nile in Shendy (between 16 and 18° N. lat.).

Physical Geography.—The most mountainous part of the table-land is east of Lake Tzana, comprehending the countries which are drained by the upper course of the river Tacazze or Takkazie and its numerous affluents. It lies between 11° 30′ and 12° 30′ N. lat., and between 38° and 39° 30′ E. long. The mountains of Samen or Semien are a continuation of this mountain-region: they extend on the west side of the river Takkazie to 13° 30′ N. lat., and rise to a great elevation above the common level of the table-land. From the source of the river Takkazie a mountainous region extends south-east to the edge of the table-land in the vicinity of Lake Haik. These extensive mountain-tracts divide the table-land of Abyssinia into two parts, the ***north-eastern*** and the ***western*** and ***southern*** region.

1. The ***North-eastern Table-land*** is also called the ***Table-land of Tigré***, because it has frequently been under one government, which has been called the kingdom of Tigré, from the name of one of its provinces. This country extends from 11° 30′ to 15° 40′ N. lat., and between 42° and 39° E. long. The edge of the table-land towards the Red Sea is crowned with a ridge of hills, which rise from 500 to 1000 feet higher than the table-land itself. Where the road leading from Massówa to Axum reaches the table-land, its elevation at the village of Halai is 8628 feet above the sea, but the hills through which the upper extremity of the Taranta Pass leads rise from 500 to 1000 feet above Halai. From the base of the hills which crown the edge of the table-land, the country descends gradually to the west, as is shown by the watercourses, which run in that direction. In most parts it is strongly undulating, so that it may sometimes be called hilly, but here and there it is intersected by small plains. The beds of the rivers are considerably depressed below the general level of the country, and are dry for the greater part of the year. This tract suffers from want of water, and is therefore sparingly inhabited. It supplies pasture for a great number of cattle, black sheep, and fine goats; asses and mules are also kept, and these animals constitute the wealth of the inhabitants, as cultivation is limited to the base of the hills, on which the villages are generally built. Hardly any thing except barley is raised. Near the range of hills the country is partially overgrown with large trees (Juniperus virginiana); but at some distance from it no trees are seen, and the higher country is only interspersed with isolated clumps of acacia. The depressions of the watercourses contain good meadows. In proceeding westward the country becomes more level, and it is said that the rivers of this tract, after running for some distance westward, reach a level country of great extent, which is called Maleb, and which during the rainy season is converted into a deep swamp. As this swamp has no channel for the discharge of its waters, this tract is very unhealthy, and uninhabited. The country between this swampy country and the edge of the table-land is called Hámasien, and constitutes the most northern and the narrowest portion of Tigré.

South of 15° N. lat. the hills which are on the edge of the table-land occupy a much greater extent in width, or rather they form two ranges, which enclose a longitudinal valley. The western range, which runs from north-north-west to south-south-east, may be called the Debra Damo range, from a monastery of that name, which is built on one of its highest and most inaccessible pinnacles. This range does not appear to rise in general more than 500 feet above its eastern base, though a few summits may attain even 1000 feet, but it constitutes a continuous ridge, and the waters originating on its declivity descend eastward, and run towards the Red Sea. These waters traverse the eastern range by several gorges, and are lost in the sandy soil of the low country of the Danákil. [Adal, P. C. S.] The eastern ridge, which is cut by deep defiles, appears in general to be as high as the western, but some of the summits rise higher. The declivities of these ridges are partly covered with low bushes and partly with grass. The space enclosed by these two ridges consists of a succession of table-lands several miles in extent, and of small valleys. The descent into the valleys is very steep. The table-lands are partly bare and partly overgrown with bushes and grass. Some of them afford good pasture, and in some places cultivation is carried on to a considerable extent, but in general it is limited to a few spots. The whole tract is destitute of trees; its elevation is probably not less than 8000 feet above the sea-level; Ategerat, situated not far from its southern extremity, is 8181 feet above the sea.

Not far south of Ategerat, near 14° N. lat., is a mountain-tract, which is connected on the east with the eastern edge of the table-land, traverses the country from east to west, and extends westward to the vicinity of the river Takkazie. It is several miles in width, and consists of steep hills with deep depressions between them. Only a small portion of this tract is available for pasture, as the hills are generally rocky and bare, and there is little cultivation. South of this tract lies the Plain of Antálo, in which the capital of Tigré is built on the declivity of a range of hills. This plain stretches from the above-mentioned mountain-tract southwards to the river Zamra, a distance of about 40 miles, and occupies more than double that space from east to west. That portion of the plain which extends eastward from the village of Chelicut is imperfectly known. It appears to consist mostly of a level tract interspersed with short ridges of hills and isolated summits, and is partly cultivated and partly covered with high grass and acacia-bushes. That portion of it which surrounds the town of Antálo is considered the best part of Tigré. It has a black soil, twelve feet deep, which yields abundant crops of grain. Except a ridge of high hills which stands between Chelicut and Antálo, it is level or undulating, but in proceeding farther to the west it appears rather hilly, which is owing to the channels of the rivers being deeply depressed below the surface of the plain, and bounded on each side by steep slopes. Agriculture extends over the acclivities of the hills, and even their flat tops are sometimes cultivated. In some places there are fine groves of large trees, which in most parts of Abyssinia are rarely met with. A few tracts which have a less generous soil are overgrown with acacia and brushwood. The superiority of the soil of this tract must be ascribed to its resting on a substratum of basalt. In the hilly tract which lies north of the plain is a volcanic hill, called Alequa, whose summit rises about 800 or 1000 feet above the village of Ategerat, or about 9000 feet above the sea-level. The elevation of the Plain of Antálo has not been ascertained, but it is probably greater than that of Ategerat. The western portion of the plain is much less fertile. Near the village of Cali, about 25 miles from the banks of the Takkazie, begins the descent towards the river, which is so rapid, that Salt observed that the difference of the temperature below Antálo and Cali amounted to 15 degrees. At the same time cultivation ceases almost entirely, and the country is covered with dark brushwood full of game. It improves a little farther on, showing more signs of cultivation, and rich pastures with numerous herds of cattle. But another considerable descent leads to a sandy and barren district overgrown with thorny bushes and mimosas, resembling the low country along the Red Sea: the pasture is scanty and bad, and cultivation limited to a few spots. By descending two terraces more, which consist almost of bare rocks, the bed of the Takkazie is reached. Here Salt found the temperature as high as 95°, whilst at Antálo it had been 65°; which shows the great depression of the bed of the river below the plain. It is probable that at this place the Takkazie is about 3500 feet above the sea, as Rüppel found it at the ford of Ber Agowe, which is about 20 miles farther down, only 3084 feet above the sea-level. Along the southern limits of the Plain of Antálo runs the Zamra river, which is bordered on its northern side by a ridge of hills not much elevated above the plain, and of little fertility, the soil being partly stony and partly sandy, and very dry: it only produces thorny bushes.

North of the Plain of Antálo, and west of the Haramat Mountains, on which the monastery of Debra Damo is built, is another plain of great extent. It is however much less elevated than the Plain of Antálo, which is proved by the long and rather steep descent by which it is entered from the south. This descent is known as the Pass of Atbara, and lies near 17° N. lat. and 40° 25′ E. long. The difference between the level of this plain and that of Antálo is probably more than 2000 feet. For Rüppel determined the elevation of Takkarákira, which lies on a hill of some elevation, at 6348 feet above the sea; and he observes that the Haramat Mountains are at least 1200 feet above the level of the plain. Pearce also observes that the natives, in ascending the Pass of Atbara, say that they pass from the warm into the cold country. This plain, which, from the name of one of the provinces which it contains, may be called the Plain of Tembien, extends from the base of the Haramat Mountains to the Takkazie, from east by north to west by south, more than 60 miles, and continues along the northern banks of the river for at least 30 miles farther, so that the whole length is about 100 miles. It is narrower at the base of the mountains, and grows wider towards the river. Its average width may be 30 miles; so that it may cover a surface of 3000 square miles. It occupies the whole space between the Pass of Atbara and the towns of Axum and Adowa. This large plain is in general not fertile. At the base of the Haramat Mountains is a tract whose soil rests on basalt, and consists of a black mould, and nearly the whole of it is under cultivation. There is another rich agricultural tract near the heights over which the Pass of Atbara passes, where wheat and barley are extensively cultivated; and two crops are annually obtained from those fields which can be irrigated; but these tracts are not extensive. The greater part of the plain consists of low sandstone hills, and the soil is sandy and unfit for cultivation. In other places there is clay slate, usually in perpendicular strata, and these tracts are still less fertile, as the water sinks down between the strata. Trees do not occur, and in most places only shrubs and bushes of stunted growth are found, among which the Euphorbia Canariensis is common. In the middle of the plain there is an extensive tract which constitutes a fine pastoral country, and is interspersed with trees. Here and in some lower depressions cultivation is also carried on to some extent. The beds of the rivers, which generally contain water even in the dry season, are considerably depressed below the general surface of the country; their bottoms are wooded, but these bottoms are very narrow. In approaching the river Takkazie the level of the plain lowers by steep and long descents, which constitute several terraces. This lower tract is a very poor country. At a place called Ber Agowe, situated nearly at the most southern part of the plain, Rüppel found the level of the Takkazie 3084 feet above the sea.

North of the Plain of Tembien are those of Shiré and Serawé. They are more elevated than the first-mentioned plain, and at the base of the ascent by which they are reached are situated the towns of Axum and Adowa. The first place is 7092 feet and the second 6216 feet above the sea-level. Hence we may conclude that these plains are at least 7000 feet above the sea. The south-western portion is called the Plain of Shiré, and the north-eastern that of Serawé; but we are not acquainted with the line which separates them from one another, nor with their extent to the north and west. The first appears to extend to the country of the Shangalla, and the last to the swampy region of Maleb. The Plain of Serawé is celebrated in Tigré for its flowery meadows, shady groves, and rich valleys. That portion of it however which was traversed by Rüppel, and which extends along the banks of the Takkazie, does not answer this description. From the banks of the river, which is at Haita 2775 feet above the sea-level, one long and steep ascent brings the traveller to the plain, whose surface is composed of sandstone, and on which a great number of volcanic cones rise to some height. The soil, consisting of the decomposed volcanic matter, is partly covered with low bushes, between which there is a fine turf that makes excellent pasture. In some glens there are trees, and among them date-trees. One of the volcanic hills, called Alequa, rises 800 feet above its base. The western portion of the

Plain of Serawé, or that which is contiguous to that of Shiré, does not differ much from it in aspect. On the plain, which is generally level, and consists of sandstone, several ridges of basaltic hills, and a few isolated ones composed of volcanic matter, rise to a small elevation above the general level of the country. The greatest part of the plain is covered with bushes, between which there are excellent pasture-grounds. The herds of cattle met with on this plain are large and numerous; but agriculture is limited to a few places. The hilly ground along the southern edge of the table-land is covered with bushes and the Euphorbia Canariensis. The eastern part of the Plain of Serawé, or that which approaches the mountains with which the edge of the table-land of Tigré is crowned, is somewhat different. Its upper surface consists of small table-lands whose surface is either bare sandstone or a thin layer of poor soil. Between the table-lands are some valleys, from half a mile to a mile in width, which are partly used as pasture-grounds and partly cultivated.

The Plain of Serawé is separated from the Haramat Mountains by a hilly tract about 50 miles in length by 30 wide. As this tract constitutes the principal part of the province of Tigré, which has given its name to this great division of Abyssinia, it may be called the hilly region of Tigré. The rivers which originate in it run westward, and form by their union the Mareb. This tract presents a great variety of surface and productive powers. Hills and short ridges are numerous; but, except one or two, they are not of great height. Some of them consist of volcanic matter or basalt, and the soil produces trees and fine grass, and is partly cultivated; but others are composed of sandstone or clay slate, and are nearly bare or only covered with low stunted bushes. Some of the plains extend several miles in every direction, are well watered, and in a state of high cultivation, whilst others suffer from want of water, and are not inhabited except in the rainy season. The valleys resemble the plains.

The southern part of Tigré, or that which is south of the Plain of Antálo, has a mountainous character. Our information respecting these countries however is scanty, as they have only been traversed by a few travellers in haste and under unfavourable circumstances. This part of Tigré comprehends the upper basin of the Takkazie and the whole basin of its affluent the Tzelari. Near the source of the Tzelari is the watershed between the rivers which flow north and south, and at some distance from it, probably on the watershed, are two large lakes, of which the larger is called Tzado Bahari, or the great lake of Ashangi, and is three days' journey in circuit: the smaller is called Guala Ashangi or Macbeah. The country surrounding these lakes and the source of the Tzelari must have a great elevation above the sea-level. Beke saw here hoar-frost in the beginning of October, and Krapf found this tract destitute of trees and covered with a coarse grass, which also occurs in Shoa, but only at an elevation of from 8000 to 10,000 feet. Both travellers complain of the cold that they experienced. The country is a complete wilderness: there is neither village nor cultivation nor cattle, nor wild beast except the fox. It suffers extremely from want of water all the year round, and produces only, at a few places, kolqual (Euphorbia Canariensis) and thorny acacias. The numerous hills which are dispersed over it are composed of sand. To the east of this central table-land of Abyssinia extends a mountainous country, of which we have no information. It is inhabited by the Raia or Azabo Gallas, who are described as the most savage of all the tribes of Africa. It is certainly remarkable that their neighbours to the south-west, the Yejju, have not the least intercourse with them, and were unable to give the least information about them and their country to Krapf. To the east of the mountains inhabited by the Raia Gallas lies a country called Zobul; it is said to be a fine country, well wooded, and producing grapes, olives, figs, cedars, and other fruits and trees; but, in consequence of long wars, it is now uninhabited. It is said to have remained in this state since the time of Mohammed Gragne. In the middle of last century, when an Abyssinian army marched through Zobul to attack Adál, the soldiers dropped a quantity of durrah, which has since continued to grow without cultivation. Zobul is contiguous to Adál. [ADAL, P. C. S.]

The country surrounding the upper course of the Tzelari river and its affluents is represented as resembling a sea agitated by a gale, rising in numerous hills like waves, with large spaces of lower ground between them. The hills as well as the depressions are covered with sand and almost without vegetation, except some kolqual-trees and thorny acacia-bushes. For the greater part of the year it is almost destitute of water, which is only found in *wadies*, which are dry during the summer. In these wadies there are only a few pasture-grounds and cultivated spots. Dr. Beke is of opinion that this tract is not so high as the basin of the Takkazie, which is contiguous to it on the west. The upper basin of the Takkazie is a much better country. It is stated that near 12° N. lat. a plain of considerable extent stretches from east to west, but we are not informed of its productive powers. North of 12° N. lat. lies the mountain country of Lasta. It forms one mass of mountains intersected by numerous steep valleys. The ridges are all flat-topped and of the same elevation, so that when seen from an eminence, where the valleys are not visible, the country has the appearance of an uninterrupted plain. Dr. Beke thinks that the general level of this plain is between 6500 and 7000 feet above the sea: but as in the northern parts of Tigré, Lasta is considered a very cold country, it is probably higher than the Plain of Antálo. The tops of the mountains are sometimes, though rarely, covered with trees; most of them however are grassy and have excellent pastures; a few only are quite barren. The descent into the valleys is often so steep and rocky as to prevent vegetation from growing. Some of the valleys are fertile and well cultivated. This region is in general well watered, and the rivers have water all the year round. Between the basin of the Takkazie and of the Tzelari is a range of mountains, which rises above the ridges that fill up the interior of the two basins, and some of its summits are very high. That tract of country which lies between the river Tzelari and the southern border of the Plain of Antálo is barren; it is almost uninhabited, and constitutes the natural boundary between Northern and Southern Tigré.

The Takkazie is the second river in Abyssinia in size, the Abai, or Nile, being the first. It originates near 12° N. lat. and 39° E. long., and its upper course in Abyssinia is to the north, until having received the waters of the Tzelari from the east, and those of the Bellegas from the west, it turns by degrees westward, and continues in that direction to the boundary of Abyssinia. Before it leaves the country it is joined by the Angrab from the south. The two last-mentioned affluents drain the whole of the volcanic region, which extends from the banks of the Takkazie to the vicinity of Lake Zana, and all the volcanic matter brought down by their rapid currents is thus carried to the Nile. Rüppel, who has seen the greatest part of the course of the Nile, is decidedly of opinion that to this volcanic matter mainly, if not entirely, the great fertility of the soil is to be ascribed, which the Nile deposits in its lower course during the inundations. If we consider that the countries lower down on both sides of the river have either a sandy or rocky soil of very moderate fertility, and are frequently desert owing to their sterility, his opinion appears to be well founded. The bottom of the Takkazie is very narrow compared with the size of the river, and there is frequently no bottom at all, the rocks rising immediately from the water's edge to a considerable height, and attaining at a distance of a few miles an elevation of from 2000 to 4000 feet above the river.

The western and southern part of the table-land of Abyssinia is called *Amhara*, from a province of that name situated nearly in the middle of it. The south-eastern portion of this large country bears the name of *Shoa*. Under the name of Amhara we shall describe the country which is divided by the Takkazie from Tigré, and extends southward on both sides of Lake Tzana or Zana to the most southern bend of the Nile or Abai. It is divided from Shoa by the last-named river and a line beginning on its banks at a place called Broken Bridge and terminating at the source of the most southern affluent of the Takkazie.

2. *The Table-land of Amhara* contains the highest mountain-range in Abyssinia. This range in the most eastern portion of the country is close to the banks of the river Takkazie in the province of Samen or Semien, whence it is also called the Mountains of Samen or Semien. This range begins in the south with Mount Zozamba, a flat-topped summit which lies near 12° 30′ N. lat. and runs nearly due north to near 13° 30′, so that in length it extends about 70 miles. The most elevated summits are towards the northern extremity of the range, where the peak called Abba Yaret rises to 15,[illegible] feet and that which bears the name of Buahat to 14,3[illegible]4 feet above the sea-level. The two high [illegible] a few miles distant from one another, Abba Y[illegible] Buahat to the west. Their northern [illegible] a ridge, over which runs a mountain-[illegible]. This pass is 12,696 feet above the sea-level. [illegible] two

summits is a deep depression, in which a river, the Mashada, which rises on the ridge of the Selki pass, runs southward. Another pass runs along the eastern declivity of the Buahat, and its highest point is only about 450 feet below the summit. Rüppel found, in July, the upper part of the summit, to a distance of 1500 feet below the summit, covered with snow. This portion of the range is composed of plutonic rocks, lava, and basalt columns of slender shape. The country between the highest portion of the range and the river Takkazie is about 30 miles in width, and is covered with mountains, which grow lower as they approach the river. The greater number of them consist of sandstone, but there are some which are composed of lava. Near the river the sandstone is nearly bare, and only here and there covered with thorn-bushes, but in ascending the steep valleys the sides of the hills are clothed with trees or fine grass, and the bottoms are either meadows or fields in which barley is cultivated and yields good crops. Agriculture is favoured by the climate, which all the year round resembles the spring in Europe, by abundance of rain in every month of the year, and by the absence of locusts, which frequently lay waste the corn-fields in other parts of Abyssinia. In the higher region the mountains, up to the parts which are covered with snow, are pasture-ground equal to the famous Alpine pastures in Switzerland, and the scenery is also very similar, except that in those regions which are above the line of trees a plant is found which resembles the palm: it is called gibarra (Rhynchopetalum montanum), and its peculiar shape makes a very pleasant impression on the observer, when it stands near tracts covered with snow. Here are also found, almost mingled with the leopard and hyæna, two inhabitants of the European Alps, the mountain-goat (Capra Ibex) and the lammergeier (Gypaëtus barbatus).

The western declivity of the mountains of Semien is less broken, and terminates about ten miles from Mount Buahat at the Plain of Entshetquab, which is about 10,000 feet above the level of the sea. This plain extends for seven miles westward, when it is interrupted by the valley of Shoada, which is at least 4000 feet below its surface, and is traversed by a river called Bellegas. The plain has an undulating surface, and is entirely destitute of wood, except those clumps of trees which surround every church in Abyssinia The soil however is good, the pastures abundant, and the barley yields rich crops. The whole plain is available for some of these purposes. Rüppel passed the months of July, August, and September, 1832, in Entshetquab, and observed the thermometer four times every day. The results of his observations are—

	5 h. 50 m.	9 h. 4 m.	12 h. 25 m.	3 h. 0 m.	Mean temp.
July 8—31 .	46·44°	56·23°	59·00°	57·56°	54·81°
Aug. 1—31 .	45·59	56·52	59·56	58·05	54·93
Sept. 1 to Oct. 4	43·85	57·74	62·07	60·05	55·93

The temperature of Entshetquab was therefore in July and August eight degrees lower than in London, but in September only a little less than two degrees. The weather was very foggy and rainy. The wind blew in the evening and morning from east-north-east, or from the mountains, and during the day from west-south-west, or from the plains.

The small table-land of Entshetquab is separated from the large table-land of Wogghera by the Vale of Shoada, which is at least 4000 feet, as already observed, lower than Entshetquab. It is from three to four miles wide at the top, and more than a mile wide at the bottom. The bottom is partly swampy, and only used as pasture-ground, but on the gentle ascent much barley and some flax are cultivated. The table-land of Wogghera extends more than 40 miles from east to west, and nearly as much from north to south. The greater part of it is about 8500 feet above the sea-level. Near the vale of Shoada its surface presents low hills and depressions; but farther on it is almost a dead level, with a few isolated hills dispersed over it. They are all of volcanic origin and of conical shapes. The highest of them, called Waaken, has only an elevation of about 800 feet above its base. There are many watercourses, but they are deeply depressed below the general level, and in summer they are dry. As the rocks which constitute the body of the table-land are of volcanic origin, the soil is rather fertile, and produces good crops of barley, which however is only cultivated in a few places. The incessant civil wars from which this country has suffered for nearly a century have driven away the husbandman, and his place is supplied by wandering herdsmen, who go with their herds and flocks during the dry season to the low country on the lake Zana. The pasture-grounds are very good: the descent from the table-land to Gondar and the country surrounding Lake Zana is gradual, and passes through several valleys, whose declivities are generally wooded, and cultivated only to a small extent. Nearly all the waters that are collected on the plain of Wogghera run off eastward, and fall into the Bellegas, which carries its waters to the Takkazie and passes through the mountain-range of Semien near 12° 35′ N. lat.

The northern boundary of the plain of Wogghera is formed by a rocky ridge, which at one place is not more than 40 feet above its level, and has a flat top. This ridge is in some places hardly 200 feet wide and at one place only 40 feet. It runs eastward for more than 60 miles, increasing in width and in height until it joins the mountain-range at the Pass of Selki. It is remarkable that this ridge, which is so little elevated above the plain of Wogghera, descends northward with a very steep declivity of more than 3000 feet to the table-land of Adarga. The place where the caravan-road cuts the ridge is known as the Pass of Lamalmon, which is of very difficult ascent, and 8802 feet above the sea-level. The table land of Adarga is somewhat more than 3000 feet above the sea. The rivers which drain it rise partly along the north-western declivity of the mountains of Semien and partly at the foot of the ridge of the Lamalmon Pass, and run in a north-western direction to the Takkazie. Near the base of the ridge the Plain of Adarga is interspersed with numerous volcanic cones, most of which are low, but they increase in elevation and size as they approach the high mountains. They are covered with brushwood, and no cultivated fields are found near them. In advancing farther north, the plain becomes more level, and in the valleys are sycamores and other large trees. Though there are some tracts of rocky hills which in the dry season are destitute of vegetation, the greater part of the plain is covered with good grass, and at intervals with numerous bushes. There are many volcanic hills here also, but they are at greater distances from one another. Near the banks of the Takkazie the country is almost a dead level. Its soil is a thick layer of mould resting on sandstone rocks, and rather fertile, so that a considerable portion of it is under cultivation. The descent from the plain to the banks of the Takkazie is more than 2000 feet of perpendicular height, and the surface of the river at Haita is 2775 feet above the sea-level.

On the west of the table-land of Adarga are the provinces of Waldubba and Walkeit, which lie on the southern side of the Takkazie, which here constitutes the boundary between Abyssinia and the country inhabited by the Shangalla and other tribes. These provinces have never been visited by Europeans. The natives describe them as fine pasture countries, well watered, and they add that the valleys are wide, and rich in agricultural produce and fine trees. The surface is mostly a level plain.

South of these provinces and west of the table-land of Wogghera is an extensive hilly tract, which may be called the *Hilly Table-land of the Kulla*. In length from east to west it occupies about 50 miles, and not much less from north to south. Its highest level is on the ridge which separates it from the low lands surrounding Lake Zana, which lie south of it. This ridge, where it is passed by the road, nearly due north of Gondar, is 1200 feet above that town, or about 8600 feet above the sea-level. It forms in these parts the water-shed between the rivers which run to Lake Zana and those which flow northward to the Takkazie. All the waters that run in the last-named direction unite in the Angrab, which is one of the most considerable affluents of the Takkazie. On the north of this ridge the country descends considerably, and though the surface is a labyrinth of rugged mountains, isolated conical hills, and rocks rising perpendicularly to a considerable elevation, none of these heights attain the elevation of the pass. A few miles from the pass the surface of the country is less hilly, and the descent is more gradual. Cultivation is here in due proportion united to pasturage. The soil between the rocks, which are chiefly volcanic, is very fertile, and maize and other kinds of grain are extensively grown. On the uncultivated tracts are thick bushes and fine groves of trees, and in the deep valleys of the rivers numerous sycamores. Farther north the hills are still less numerous, and mostly covered with bushes, but the depressions are swampy and overgrown with high canes. The ground then ascends, and on the back of the ridge stands an isolated mountain-mass, which attains a great elevation and is called Mount Ankodib. From its base the country descends northward in an undulating plain into the Kulla. The Kulla is a depression, similar to a lake, between four and six miles wide, but of great extent from east to west. Though only about 600 feet lower than the ridges which lie north and south of it, it is 3600 feet lower than the above-mentioned pass north of Gondar, or only 5000 feet above the sea-level. Its soil is somewhat swampy, partly covered with canes more than ten feet high and partly with fine trees. Several rivulets pass through it in various directions, and form pools and small lakes. This low country is uninhabited on account of the bad air. Through want of ventilation the vapours rising from the surface, which is covered with water during the rainy season, accumulate to such a degree that it cannot be passed by any person without contracting a malignant fever. It is the haunt of numerous wild animals of the largest size. Buffaloes (Bos caffer) and elephants are met with in herds in and near the lakes. There are also rhinoceroses with two horns, and various species of antelopes and deer of very large size, especially Antilope defassa, Rüppel.

We come now to that depression of the table-land of Amhara, the lowest part of which is occupied by Lake Zana, called also the Lake of Dembea. The surface of the lake is 6110 feet above the sea-level; and from its shores a flat country extends on all sides to the high lands which surround it at different distances from the lake. From the mountains inclosing the basin of the Upper Takkazie on the west, two low ridges run off westward and approach the shores of the lake: the northern, on its north-eastern bay, opposite the island of Mazraka; and the southern, north and south of the efflux of the Abái from the lake. These two offsets separate from one another the three plains surrounding the northern, eastern, and southern sides of the lake. These plains derive their names from the provinces in which they are situated. The northern is called the Plain of Dembea, the eastern the Plain of Biegemider, and the southern the Plain of Miecha.

The Plain of Dembea, which is also called the Plain of Gondar, from the capital of Amhara, which is built on hilly ground at the north-eastern extremity of the plain, extends about 20 miles from north to south, and 40 from east to west. Its surface at Gondar is 7420 feet above the sea, so that its descent is rather rapid: for in 20 miles it sinks 1300 feet lower. Near the surrounding heights there are numerous low volcanic hills, mostly overgrown with bushes; and in their vicinity the soil is fertile, and part of the country is under cultivation. At a distance of three or four miles from the heights the hills disappear, and are replaced by an undulating surface, whose soil, being composed of disintegrated volcanic matter, is a black mould of great fertility, but very little of it is under cultivation. There are no trees, except round the churches. Bushes are frequent, but occur only in patches. In the dry season, from October to April, the country is almost covered with herds of cattle, which, when the rains begin, are driven to the table-land of Wogghera, because the plain is then nearly converted into a swamp. Even in the dry season those tracts which are near the lake are marshy, and only inhabited by fishermen. The plain is drained by many small rivers, which at the close of the dry season are dry, with the exception of the largest, named the Angrab. Rüppel passed six months and a half at Gondar, and made meteorological observations four times every day. The result of these observations follows:—

1832.		5h. 40m.	9h. 6m	12h. 30m.	3h. 33m.	Mean temp.
Oct. 15-31	.	56·43°	66·89	72·99°	72·88°	67·30°
Nov. 1-30	.	56·52	66·31	72·81	70·96	66·60
Dec. 1-4 & 12-30		53·09	64·85	72·05	71·24	65·31
1833.						
Jan. 1-31	.	57·26	66·62	74·27	73·40	67·88
Feb. 1-28	.	57·24	68·58	77·81	76·18	69·94
March 1-31	.	59·94	73·58	80·66	79·90	73·52
April 1-30	.	61·79	75·17	79·88	75·60	73·11

It would be very interesting to compare these observations with those made at Mexico, especially as the difference of elevation is small, Mexico being 7470 feet and Gondar 7420 feet above the sea-level. The difference in latitude is less than seven degrees, Mexico being situated in 19° 26′ and Gondar in 12° 36′ N. lat. The meteorological observations however respecting Mexico, which have been published in Humboldt's work, do not contain the months of January, February, and March, because their mean temperature had not been ascertained. For October it was 61·52°, for November 59·92°, for December 56·66°, and for April 65·48°. From these data we may conclude that the temperature of Gondar is from six to nine degrees higher than that of Mexico, which appears to be more than could be expected from the difference in latitude. The annual quantity of rain at Gondar is very great, which is not generally the case on elevated table-lands, and perhaps is to be ascribed to the circumstance of the town being built in a wide depression of the table-land, and partly surrounded by heights which rise a thousand feet above its level. The annual quantity in 1770 was 35·5 inches, and in 1771 it was 41·3 inches. In January hardly a shower falls, but the rain becomes more frequent in February and March. In April and May there is more rain, but the rainy season properly commences in June and lasts to October. In July and August the rains are very heavy, so that nearly two-thirds of the whole annual quantity fall in these two months. In September the rains become moderate, and in October they cease, with the exception of a few short showers which fall in November and December. During the rains the wind blows in the morning from north-east, but it turns before nine o'clock to south-east, and at noon it blows from the south-west. In the afternoon it turns to north-west, where it remains until it becomes calm after sunset.

The narrow strip of low country which lies west of Lake Zana is a part of the Plain of Dembea, and is included in the province of that name. The adjacent heights do not rise to a great elevation above the level of the lake. Their declivities are overgrown with bushes and stunted acacia-trees, from which a considerable quantity of gum-arabic might be collected. At the base of these heights the country is fruitful, and a considerable portion of it is under cultivation; much durrha is grown. This tract is considered one of the granaries of Gondar. In the vicinity of the lake no cultivation is carried on, the whole being used as pasture-ground and meadows. The deep black soil is very favourable to vegetation, and usually covered with high grass. Cattle are very numerous. Though there are many rivers, they all originate in the heights, which are seldom more than ten miles from the shores of the lake, and accordingly the courses of the rivers are short. They are dry in January and February; but, as they receive their waters from a much more elevated country, their course, as long as they have water, is rather rapid, and different from those of the great plain of Dembea, which have a sluggish current. The village of Dingelber stands on a rock which forms the extremity of a ridge that projects from the heights on the west, and which approaches so near to the lake that there remains only a narrow place on its shores, through which the great road passes which leads from Gondar to Miecha and Gojam. The table-land which is west of the tract just now noticed is that of Kuara and Ras-el-Feel, of which the first-named province forms the southern and Ras-el-Feel the northern part. Kuara has never been visited by a European, but Bruce passed through Ras-el-Feel, which he describes as a fertile and level country with a rich black soil. The surface is mostly covered with bushes, and occasionally there is a grove of trees. Cattle and horses are numerous; butter, honey, horses, and gold, which is here found in larger quantities than in any other part of Abyssinia, are the principal articles which are sent from Ras-el-Feel to the other provinces and to Sennaar.

The Plain of Biegemider, which lies on the eastern side of Lake Zana, extends from near Emfras on the north to the banks of the Abái or Nile, nearly forty miles in length. Its width, from the low shores of the lake to the high mountain-masses which inclose the upper basin of the Takkazie on the west, is nearly thirty miles. The mountain-masses rise from the plain with a steep ascent, except where their edges are broken down by the torrents and rivers, which originate on the higher land and tumble in cataracts into the lower plain. The elevation of these mountains of Biegemider is estimated by Dr. Beke at between 7000 and 8000 feet above the sea, the last-mentioned elevation being assigned to the Pass of Chámma Marágfia. As the level of Lake Zana is 6110 feet above the sea, the mountains of Biegemider rise only from 1500 to 2000 feet above their bases, or rather less, as the plain has a gradual rise from the shores of the lake to the foot of the mountain masses. North of the river Reb, where the plain is not so wide, it consists of two tracts of different characters, a lower one skirting the shores of the lake for several miles, which in the rainy season is inundated and in the dry season covered with aquatic plants or grass, and a more elevated part which has an undulating surface, and is covered with low bushes. No part of this district is under cultivation, but both supply pasture. On the declivity of the mountains there are extensive orchards which produce fine grapes. From the river Reb to that of Fogara, and even farther to the south, the country is a dead level, and the soil consists of a fine black mould of great fertility, which is the deposit of the earthy matter brought down by the rivers Reb and Gomára. There are no springs, but good water may be found by digging to the depth of a few feet. There are no bushes or trees, except near the churches. Only a small portion of this fine tract is at present cultivated; but the numerous traces of the canals for irrigation show that formerly it was a corn country, which has been reduced to its present low state by the internal wars of a century. Numerous herds of cattle find pasture during the dry season, but when the rains have converted the whole into a swamp, the cattle are taken to the high land on the east. Near the banks of the rivers are extensive fields, in which lupines and vetches are cultivated. The beds of the rivers in the dry season are not more than five feet below the level of the plain. This country is better peopled than the adjacent provinces of Abyssinia. The most southern district of the plain of Biegemider, or that which lies between the river Fogara and the Abái (Nile), at its efflux from Lake Zána, has a very broken surface, being traversed by several ridges of rocky hills which detach themselves from Mount Chámma Marágfia, and run westward to the lake and south-westward to the Abái. These ridges are covered with fine forest-trees, and as the depressions are extensive and well watered and have a fertile soil, cultivation is carried on to a great extent. As in approaching the banks of the Abái the country becomes more broken and rugged and rises higher, the village of Démbasa, though only five miles from the river, is at least a thousand feet above its level at the bridge which is here thrown over the Abái. The hills which skirt the banks of the river are composed of volcanic rocks, and show great fertility in the vigorous growth of the trees and bushes with which they are covered. From the efflux of the Abái from Lake Zana to the vicinity of the cataract of Alata, the river runs through a wide bottom which is covered with the finest grass.

3. The Plain of Miécha is a part of the ***Peninsula of the Abái***. This peninsula forms a part of Amhara, but as it is naturally separated from the other divisions of the country, and constitutes by itself a well defined system, it ought to be noticed separately. The river Abái and Lake Zana surround it on the north, west, and south, and its western limits may be tolerably well defined by a line drawn from the banks of the Abái where it is joined by the Jamma to the village of Dingelber on the shores of Lake Zana. Thus limited, the peninsula extends in length from east-south-east to west-north-west 150 miles, with an average width of about 100 miles, so that it covers an area of 15,000 square miles, or more than half of Ireland.

The *Abái*, as this great branch of the Nile is uniformly called by the inhabitants of Abyssinia, rises near 11° N. lat. and 37° E. long. at the foot of Mount Giesh, in a swampy tract. The source of the river is 8700 feet above the sea-level, and the summit of Mount Giesh about 9700 feet. After running northward for about 60 miles in a straight line, the Abái descends from 8700 feet to the level of Lake Zana (6111 feet), or about 2600 feet, or more than 43 feet a mile; the current is of course extremely swift, and forms a kind of continuous rapid, interrupted by some cataracts. One of these was visited by Bruce, who found its perpendicular height 16 feet, and he heard of another. The Abái enters Lake Zana on the south-west side and leaves it on the south-east side. According to Bruce this lake is 35 miles broad in the widest part, from east to west, but it decreases in width towards the extremities, where it is sometimes not above 10 miles wide. Its greatest length, according to the same authority, is 49 miles. Bruce and Rüppel, the two travellers who have had an opportunity of examining this lake, have given it quite a different shape on their maps. That on the map of Rüppel is much more regular. The number of rivers which the lake receives from all sides is very great; those which join it from the north and west are dry during a great part of the year, but most of those which fall into it from the east and south contain water all the year round. The immense supply of water which the lake receives during the rains, raises its level sufficiently to lay under water the low country on its banks to the distance of two miles. There are many islands in this lake; Rüppel has laid down eighteen in his map. The greater number of them are inhabited. The largest, called Deck, is low, but of considerable size. To the east of it is the island of Daka, which is elevated and terminates in a cone. Fish is abundant and of various kinds, most of which are of the family of the Cyprinidæ, and are taken in great quantity. The hippopotamus is common in the lake, but the crocodile is not found there. The Abái river leaves Lake Zana north of its south-eastern corner, and after running south-east for about 15 miles it forms the cataract of Alata or Tis Eset, where the river descends about 100 feet perpendicularly. Below the cataract it runs with great violence through a deep fissure in the rock, which at one place is hardly more than two yards wide. We may form a notion of the rapidity of this part of the Abái, from the fact that at the Broken Bridge, which is about 40 miles from the efflux of the river, its level is not more than 3852 feet above the sea. In 40 miles therefore the river has fallen 2259 feet, or about 56 feet per mile. From the Broken Bridge the current abates. North of the Mietta Ford, which is north of the place where the Abái is joined by the Jamma, after a course of about 100 miles, its level is still 2936 feet above the sea. In this space therefore the Abái has fallen not much more than nine feet per mile. At the Mietta Ford the river begins to turn westward, and by degrees to the north of west. At the Melka Kuki, or Ford of Kuki, 60 miles lower down, the elevation of the Abái above the sea-level is 2815 feet. In 60 miles therefore it has fallen 111 feet, or not quite two feet per mile. Where the Abái leaves Abyssinia it is joined by the river Durra.

The interior of the peninsula of the Abái is traversed by a mountain-range whose general direction is from west-north-west to east-south-east. It may be called the Talba Waha mountains, though that name is properly applied only to the most elevated portion of it, which extends between 37° 20′ and 37° 50′ E. long. This range begins on the western border of Abyssinia with Mount Eshiti, and runs eastward to Mount Barf, Mount Atzab, and Mount Giesh, where the sources of the Abái are. Mount Giesh, as already observed, rises to 9700 feet above the sea, and a lower ridge connects it with Mount Lichema, which is still higher. East of Mount Lichema there is a depression in the range of a considerable extent, but then the range attains its greatest elevation, as it is supposed, for the elevation of no part has been ascertained by actual measurement or in any other way. This portion is called Talba Waha. Where it begins to decrease in elevation east of 37° 50′ it is crossed by the great commercial road leading from Northern Abyssinia to Gójam. The summit of the mountain pass through which the road runs is at least 11,000 feet above the sea-level; and Mount Goéba, which is near and on the northern side of the range, is 8751 feet high. East of the mountain-pass just mentioned, the range subsides and has only a moderate elevation above the general level of the country; at the same time it changes its direction, and runs to the north-east. As it approaches the banks of the Abái it rises again to a considerable elevation in the mountain mass of Mount Yékandach. This mountain may be considered as the termination of the Talba Waha mountains. It does not appear that any summit of this range is always covered with snow, but the higher portion is cold from November to March. This range is in general covered with forests of large trees, but there are many tracts under cultivation, which produce nearly all the grains that are cultivated in Europe. The higher region is dotted with heaths and ferns, and the most elevated is an extensive level producing stunted grass, interspersed with numerous gibárra plants (Rhynchopetalum montanum). At the base of the Talba Waha mountains lie the Plains of Miécha and Gojam. The first extends northwards from their base to the shores of Lake Zana and the Plain of Gójam from their southern foot to the banks of the Abái. The descent towards the lake terminates at 6111 feet above the sea-level, but that towards the Abái at 2815 feet, this being the elevation of the river at Melka Kuki.

The country which extends from the northern base of the Talba Waha mountains to the Lake Zana is called the Plain of Miécha (Maisha, Matcha), from a province of that name, but this name properly applies only to the low country which extends from the Pass of Dingelber along the south-western shore of the lake to its most south-eastern corner. Between the south-eastern corner of the lake and the Abái, after its efflux from the lake, there is a hilly tract consisting of rocks partially overgrown with stunted bushes. The low plain along the shores of the lake, which is narrow near the Pass of Dingelber, widens as it proceeds southward, and where it reaches the Abái river it is 20 miles wide, extending from the lake to the confluence of the Abái and of the Kelti. A line drawn from this point to the village of Kariagna, on the river of that name, and thence to the Tis Eset cataract, would separate the low plain of Miécha from the hilly tract that lies south of it and extends to the base of the Talba Waha range. This plain is very fruitful, the soil being an alluvium composed of the detritus brought by the rivers from the higher country, but as it is entirely flat, it is not well drained; the currents of the rivers are stagnant at the close of the dry season, especially in January and February, and many pools are left by the inundations. This renders the country unhealthy; as however the soil is very fertile, a large portion of the country is well cultivated, and produces abundant crops of every kind of grain. A narrow tract near the lake is too swampy for cultivation, and is partly used as pasture-ground, but the greater portion of it is overgrown with aquatic plants, especially a large kind of rushes, which for want of wood are used for the construction of the small boats by which the lake is navigated. There are no trees or bushes on the plain, except near the base of the more elevated tract south of it, where there are groves of acacias. The hilly tract occupies about 20 miles in width along the banks of the Abái to its confluence with the river Jamma. Its surface is diversified with several low and rocky ridges, between which are small plains. The courses of the rivers, which are rather rapid, show that the descent of this tract is considerable, and this prevents stagnation, and renders the country healthy. The soil is chiefly composed of decomposed volcanic matter, and is fertile. Those tracts which are not cultivated are generally covered with woods of acacias, which attain a considerable size, and those tracts which are destitute of trees and bushes are overgrown with wild oats and wild lupines. This tract contains abundance of water, and is very healthy. Between it and the mountain range lies a mountain region. Several summits, as Mount Lijustera and Amidamit, rise to a great elevation, but between these and other ridges are many tracts of more level ground, which are partly cultivated notwithstanding the gullies and beds of torrents which intersect them and sink deep below the general level of the country. The lower parts of the mountains are covered with herbage and acacias, and higher up are forests of different kinds of trees. The pastures on these mountains are excellent. Even in the vicinity of the sources of the Abái large quantities of barley are raised. Along the eastern bank of the Abái is a marshy plain, several miles in length and bounded by high hills, which is partly used as pasture-ground. The eastern part of the Plain of Miécha, or that which borders on the banks of the Abái below its efflux from Lake Zana, and which terminates at Mount Yékandach, has a somewhat different character. Its general level is much higher than the low part of the plain before mentioned, but it is tolerably even, except that it is furrowed by numerous deep valleys, in which the watercourses lie; towards the Abái its descent is generally steep and difficult. The soil of the level grounds is of moderate fertility, and partly cultivated and party used as pasture-ground.

The Plain of Gojam is surrounded by the Abái in the form of a semicircle, which on the east begins at Mount Yékandach, and terminates on the west at the mouth of the river Zingini. The middle region is a table-land from 2000 to 3000 feet above the level of the river. This table-land is about 20 miles wide. About the same space is occupied by the broken country which lies between the plain and the river. Between the plain and the highest part of the Talba Waha Mountains is a mountainous tract somewhat less than 20 miles in width. Thus the average width of the whole region is about 60 miles. The ascent from the river from the Ford of Mietta (some miles north of the mouth of the Jamma) is formed by a succession of bluffs which rise in terraces. Near the river the whole is thickly clothed with jungle, and no part of it is cultivated; but higher up the jungle is less dense, and occasionally intermixed with cultivation. Towards the level country the ascent is more regular, the country rising with a slight and continual slope. Here the jungle alternates with grassy tracts, but even here cultivation is rare. The watercourses run in beds deeply depressed below the surface, and with great rapidity. The ascent from the south from the fords called Melka Kuki and Melka Fari is much more irregular and steep. About seven or eight miles from the banks of the river there runs a steep and almost perpendicular wall, which in the lowest parts is from 500 to 600 feet high, but in some places crowned with peaks that rise several hundred feet higher. Between this wall and the river, but nearer the river, is another terrace, whose descent is not so steep, and it is not so high. Offsets from the higher terrace occasionally advance nearer to the river, where they appear like hills. The banks of the river are rocky and precipitous. Above the highest of the terraces is a level tract several miles in extent, which rises regularly but slowly to the north. This tract contains the large towns of Yejúbbi and Yaush, and the market-town of Báso; and the country is almost entirely under tillage, except towards the north, where it approaches the last steppe or terrace, and is there used as pasture-grounds. The last steppe, which is more than 20 miles from the river, is formed by a slope of moderate declivity, and rises only about 200 feet. Near the western extremity of this region is the ford called Melka Abro, and here the ascent occupies only about 12 miles in width, and is much more regular, as it rises gradually from the rocky banks of the river, and is only occasionally interrupted by solitary hills. On this slope the country is cultivated, but only to a small extent. All the watercourses that traverse these ascents run in very deep beds, and the sides of the heights which border them are clothed with jungle or trees.

The table-land itself differs considerably in its eastern and western districts. The eastern district is the plain of Gojam and the western that of Damot. The Plain of Gojam extends westward to the banks of the river Godieb, an affluent of the Bir, and comprehends somewhat more than one-half of the table-land. Towards the mountains of Talba Waha it is almost a perfect level, through which the rivers run with a sluggish current; but where it approaches the descent to the Abái the rivers sink much deeper below the general level of the country, the current is quick, and at some places interrupted by rapids and cataracts. In these parts also there are a few hills on the high grounds between the watercourses. No trees are found in this plain, except the plantations round the churches. Those districts which are quite level are covered with grass, and are very little cultivated and inhabited; but where the ground is somewhat broken, cultivation is carried on to a greater extent. The Plain of Damot, between the river Godieb and the Zingini, rises and sinks alternately with gentle slopes. The current of the rivers which traverse it is rapid. Hills are more numerous than in Gojam, and rise to a greater elevation. Where the country is not cultivated, it is covered with forests: grassy plains are comparatively rare. A great part of the plain is well cultivated, and studded with villages. The gradual fall of the country from the mountains to the Abai often allows the fields to be irrigated by merely diverting to them a portion of the waters of the numerous streams. The south-western portion of the plain, or that which lies contiguous to the descent to the Melka Abro (Ford of Abro) is a perfect level, overgrown with gigantic grass: as we approach the descent to the Abái, it exhibits some signs of cultivation. In some places the grassy plain is interspersed with swamps. It is stated that this part of the plain could be cultivated with advantage, but for the frequent inroads of the Galla tribes which inhabit the southern banks of the Abái.

The country which extends from the bank of the Zingini to the western boundary of Abyssinia, may be called the *Volcanic Region of Agaumider*. The name of this province is derived from a nation, the Agows, who differ from the other inhabitants of the country. The river Zingini runs in a bed of volcanic rocks, and the adjacent country exhibits unequivocal signs of volcanic origin. The soil is very fertile, being formed by the disintegration of volcanic rocks, which in some places protrude through it. The surface is much broken. Such is the country between the river Zingini and a continuous ridge of high hills which, on the north, is connected with the western and lower continuation of the Talba Waha Mountains at Mount Barf, and thence runs in a south-west direction towards the banks of the Abái. This ridge consists of a mass of volcanic cones or high-pointed domes; the Peak of Fudi, which stands nearly in the middle of them, rises to a considerable elevation above its base. From the west of this elevated mass several lower ridges run off to the westward to the distance of several miles, when they terminate with bluffs in the adjacent plain. This tract has a heavy argillaceous soil, which is cultivated, and by means of irrigation yields abundant crops. In some places the volcanic rocks peep through the soil. The plain, which extends farther westward, is of indifferent quality, and chiefly covered with brushwood, with occasional patches of cultivation. The rivers which originate at the foot of the volcanic ridge run westward and fall into the Durra, an affluent of the Abái, which constitutes the boundary-line between Abyssinia and the country of the Shangallas, a tribe of negroes. Where this volcanic region approaches the Talba Waha Mountains, it is less fertile, though there are some fine plains between the high hills and mountains, which are largely cultivated, and covered with numerous villages: there are other tracts which are only used as pasture-ground, but they are covered with excellent grass, and filled with herds of cattle.

Dr. Beke, who in 1841 and 1842 passed a whole year in these regions, has given an account of the seasons. The rains are more heavy and continual in the peninsula of the Abâi than in the Plain of Gondar. It was only during the month of January that no rain fell. In February slight rains only were experienced on ten days, and in March on nine days. In April they were much heavier, and very frequent from the middle of that month. In May rain fell only in the night or in the evening on four days, except the last three days, when every evening a heavy storm with thunder and lightning was experienced. The regular rainy season commenced in June. Rain fell more or less every day, with the exception of five days, and continued through July and August. On the 11th of July the Abâi had risen so much as to be no longer passable. The rains continued to be heavy till the 16th of September, and till the end of this month it rained every night and sometimes in the day. Heavy rains were experienced up to the 7th of October, when for the first time none fell. It was stated that the rainy season had commenced sooner and continued longer than usual. Still, notwithstanding this duration of the rain, the rivers had fallen considerably, and in the middle of September the Abâi was crossed by the Gallas, who brought cloth and cotton to Baso market. The rain kept falling for several days in October, but in November it rained only on six days, and slightly. In the beginning of December only showers were experienced, but after the middle of that month heavy rains fell on several days.

4. *Shoa*, as a political division, extends only over the south-eastern portion of Abyssinia, from the northern banks of the Hawash, which divides it from the independent Galla tribes, to the Berkona, which falls into the Hawash (near 12° N. lat.), and the Wanchit, an affluent of the Jamma, which joins the Abâi; but we shall notice under this head also the countries that lie farther north, and extend to the upper basin of the Takkazie and the central table-land of Woffla, though they are in possession of independent tribes.

The Jamma is the largest tributary which the Abâi receives on the table-land of Abyssinia. It drains a great extent of country, which extends to the eastern edge of the table-land, and brings a great volume of water to the Abâi. Where it falls into that river its surface is less than 3000 feet above the sea-level. From this place the country rises to the south and to the east until it attains an elevation of between 9000 and 10,000 feet above the sea. On the south the table-land slopes gradually down to the wide plain, which is drained by the Hawásh river. But on the east, at the upper branches of the Jamma, it descends with a steep declivity, similar to that with which the table-land of Tigré terminates towards the Red Sea at the back of the harbour of Massówa and Annesley Bay.

The valley of the Jamma appears to be enclosed on the north as well as on the south by high mountains, which rise from 4000 to 5000 feet above its level. These heights however are only the bluffs with which the table-land of Shoa terminates on both sides. The ascent is steep, but there is usually a wide terrace between two steep acclivities. This terrace on the southern side of the river has a slight slope towards the river, and is generally fertile, and studded with numerous villages which contain a considerable population. The number of rivers which join the Jamma from the south is very great. Though their course towards the interior of the table-land is not rapid, they run with great velocity as they approach its northern edge, and most of them fall precipitously several hundred feet into a ravine, in which they continue to flow to their receptacle. Thus the edge of the table-land is cut by narrow valleys into a great number of comparatively narrow ridges, which give it the appearance of a very mountainous country. This is particularly the case in the western district, towards the junction of the Jamma with the Abâi, where the affluents join the principal river at right angles. Towards the eastern edge of the table-land they run nearly parallel to one another, and here the ridges between the valleys are more extensive, at least when compared with the still narrower ravines in which the rivers run. These ridges are generally level at the top, except towards their termination between the two rivers, where they approach their junction, and in these parts they gradually grow lower. Though the soil is chiefly rocky, it is of good quality, and produces pulse, tobacco, cotton, maize, and other grains. There are trees about the numerous villages. There are other tracts which are without villages or trees, but they supply pasture to numerous herds of cattle, except towards the west, where the country is overgrown with jungle; some tracts produce only aloes and stunted acacias. The steep sides of the vall also are usually clad with jungle. About 15 miles from banks of the Jamma the table-land takes that form whic expressed by this term. There are a few hills dispersed it, but in general it stretches away to the water-bed betw the Hawash and the Jamma either in a level plain or with undulating surface. Near the watershed itself or upo isolated high hills and short ridges again make their app ance, but they do not rise to a great elevation, except Garra Gorpha ridge and Mount Finfinni. But towards source of the Hawásh and between it and the mouth of Jamma the country is more broken. The greater part of eastern district of the table-land is destitute of trees bushes. Some tracts are partly cultivated and partly use pasture-ground, but others are entirely left to the herds flocks, cultivation being limited to the hills and the hig tracts surrounding their bases. In these parts also man the rivers are dry for two or three months in the year. western districts of the table-land, which have a more une surface, are well watered, as the rivers flow all the year rou These districts are covered alternately with forests of high tr and by grassy plains without bushes. In approaching sources of the Hawásh the whole country is almost one for the haunt of elephants and buffaloes.

Our information respecting the southern declivity of table-land of Southern Shoa is very scanty. But it is kno that near the watershed between the Jamma and the Haw rivers it descends with a gentle slope resembling a sligh inclined plain. It is however not improbable that near banks of the Hawásh a steep descent may exist, when i considered that the river at Melka Kuya, where it is traver by the caravan road from the harbour of Tajurra to Ankó is less than 2200 feet above the sea-level, and certainly fr 5000 to 6000 feet below the watershed on the table-la There are a few high hills or mountains dispersed over slope, among which the most elevated are Mount Enl Mount Sekuála, and Mount Ferrer. Considerable tracts well cultivated and studded with villages, but more detai information is still wanting, as this part of the table-land hardly been seen by Europeans. We do not even know the mountains which extend southward from Ankóbar i the province of Bulga constitute only the edge of the ta land, or are a ridge which on both sides, on the west and e is bounded by a low country along its base. The course the rivers favour the first supposition.

The eastern edge of the table-land of Shoa, from the to of Ankóbar northward to a distance of about 50 miles, is w known; it rises with a steep ascent from the low country w of the Hawash river, which is only about 2000 feet above sea-level, to an elevation of from 8000 to 9000 feet. T whole ascent does not appear to occupy more than eight or miles in width; to the west of it the country continues fo considerable distance at the same elevation. The town Angolalla, which is several miles from the edge, is 8564 f above the sea-level, and surrounded by a plain intersected hills and rivulets. The ascent is best known between t Melka Kuya and Ankóbar; the distance in a straight line about 30 miles. In the first ten miles from the river t country contains several plains of moderate extent, divid from one another by low hills; the level tracts are genera destitute of grass and water, and the higher parts clothed wi jungle, in which sheep and goats find pasture. At Atko the country begins to rise, but in the next ten miles it hard attains an elevation of more than 3000 feet above the s This tract is thickly wooded, and between the trees the so trine aloe completely covers the ground. The lower tra between the hills are cultivated to a small extent. In the l ten miles the country rises to more than 8000 feet above t sea, the town of Ankóbar being 8198 feet above it, or ab 700 feet higher than the city of Mexico, which is 74 feet above the sea; but Ankóbar is on the declivity, and t table-land is 400 feet above it. This steeper part of the asc is very broken and hilly, consisting of a succession of valle and steep hills, which are partly wooded and partly cultivate the soil must be rich considering the vigorous vegetati which it shows. The villages are small, but numerous; th consist of a few houses, which have a circular form, with conical roof, and are perched on the sides or summits of the hil

In proceeding northward along the ascent, it preserves t same features, except that from time to time a valley is m with of moderate width, and of superior fertility to the a jacent tracts. There are also extensive tracts which are me wastes; they are generally more level than the other parts the ascent, and covered with bushes and herbaceous plants or woods of acacia; in some places there are forests of acacias, kolquals, and euphorbias. Where these level tracts are at a considerable elevation above the country at the base of the descent, they suffer from want of water; and where they are much lower, they are intersected by numerous watercourses and interspersed with swamps. The edge of the table-land is hilly, rising and descending alternately. In the depressions the ground is swampy or springy, and here are the sources of the rivers which descend to the east and west. In many places this edge is much higher than the town of Ankóbar, which is proved by the difference in the degree of cold, and by the vegetation, which near the highest part of the rocky masses consists only of fir, heath, and fern. Some high mountains rise above the ascent, among which Mount Emmamret, a few miles north-north-east of Ankóbar, rises to a considerable elevation, but probably not above the line of trees, which is about 11,000 feet above the sea-level.

It is not known how far this steep ascent of the table-land continues to the north. It certainly extends from Ankóbar to Kok Fara, a distance of about 50 miles, and probably to Antziokia, 35 miles farther, but in the parallel of Lake Haik (10° 25′ N. lat.) it appears that the country lowers on both sides of the watershed with a long and gentle slope. Krapf, who passed over this country, does not speak of any difficulties. It cannot be urged against this supposition, that the watershed lies on the table-land, and that the descent from it is at a considerable distance from it farther to the east; for Krapf expressly states that the climate grew much warmer as he descended from the watershed eastward; but he also says that several lofty isolated mountains were observed on or near the watershed, among which Mount Sako rises above the rest.

The country which lies contiguous to the steep ascent of the table-land (from 9° 30′ to 11° N. lat.) on the west continues for a short distance to preserve the elevation of the edge, and then slopes gently to the west. The surface is generally level, forming plains interspersed with small hills or short low ridges; these plains however rise in elevation as they proceed northward, and as they approach Antziokia their surface is rather hilly than undulating. The most remarkable feature of this *Northern table-land of Shoa* is the deep depressions in which the rivers run; for a distance of several miles from the watershed they run in deepish valleys, but farther on they fall down in cataracts several hundred feet high into deep basins, and below these basins they continue to flow between steep and lofty banks; the descent to them is frequently 500 or even 1000 feet. The valley through which the Kachena, an affluent of the Wanchit, runs, is 3000 feet below the upper edge of its banks and the general level of the country, according to the estimate of Krapf. How far this peculiarity of the river-valleys continues westward is not known, as the whole country to the banks of the Abái river, which is about 80 miles distant from the region just described, has never been visited by any European; but as the country near the banks of the Abái is also several thousand feet above its bed, it is probable that these deep valleys continue through the whole width of the region. These valleys are generally well wooded; but the table-lands between them are destitute of trees and bushes, and are only used as pasture-ground, though they have a deep black soil of great fertility, which is proved by the abundant crops which are obtained from the fields at the base and on the declivities of the small hills, which occur everywhere, and in some places in considerable numbers. The grains and pulse which are principally cultivated are wheat, barley, peas, and hogs' beans. Cotton, maize, and many other plants do not succeed on account of the cold, which proves the great elevation of this part of the table-land. No domestic animals are so well suited to this country as a kind of black sheep, of which there are numerous flocks.

North of 11° N. lat. the table-land, as already observed, slopes down to the east and west. The scanty information which we possess about this country is not sufficient to give us a general idea of its character. It was traversed by Krapf under very unfavourable circumstances. This bold missionary informs us that several high mountains rise on the watershed, but where he crossed it there were two valleys separated at their upper extremities by a ridge of no great elevation. The western valley, called Totola, from a celebrated market-place there, is intersected by the river Gherúdo, an affluent of the Bashilo, and on both sides enclosed by a range of hills partly covered with juniper-trees. On these hills there are many hamlets and villages. The valley is wide and well cultivated; the surface is irrigated artificially from the river, and as the elevation above the sea is considerable, the air is cool even in summer. The eastern valley is watered by the Berkona, an affluent of the Hawash; as several hills are dispersed over the adjacent country, it does not form a regular valley; the soil is black, of great fertility, rich in wood and grass for cattle; in many parts it is well cultivated, and as maize and cotton are grown, it is evident that it must be much lower than the country on the other side of the watershed, a fact which is expressly stated by Krapf.

The country west of the watershed on both sides of the river Bashilo, an affluent of the Abái, and extending to the high ranges that surround the sources of the Takkazie, is probably the most elevated portion of the table-land of Abyssinia. It comprehends the ancient province of Amhara, and is now in possession of the independent tribes of the Wollo Gallas. Though there are, according to Krapf, very mountainous regions among the Wollo tribes, the country is in general level; there are some plains of considerable extent on which only a few single hills are found, whilst in other places ridges of hills traverse the country, and some summits rise to a considerable elevation above the base. The rivers run through bottoms which are bounded by steep rocky masses, but it does not appear that their beds are so much depressed below the general level of the country as they are farther south. Some of the plains are complete wildernesses, whilst others make good pastures, and in some places are well cultivated; but only barley is grown. Sheep are most numerous, and especially that kind whose skin is called *lovisa*, which seems to be peculiar to this region. The wool is of a black colour, and about eighteen inches in length. The people take great care of these animals, lest they should get too fat, for then the wool falls off. They are placed on bedsteads and cleaned every day with water, and fed with roasted barley and other food. A skin of good quality is sold for a dollar and upwards, which is a very large sum in that country. These skins are worn by the warriors, and give them a very martial appearance.

The country which lies east of the watershed is in possession of a tribe called Yejjoo or Yechoo, whom Bruce considered to be a tribe of the Galla; but Krapf, who traversed the whole of their country from south to north, says expressly that the Yejjoo are not Gallas nor pagans. They speak the Amharic language, and all of them are either Christians or Mohammedans: their features differ from those of the Gallas, and resemble those of the Abyssinians. Near the southern extremity of their country is Lake Haik, whose circumference may be about 45 miles. Its greatest extent is from east to west. On the south and east it is surrounded by high and steep hills, but on the north and west by a low level country. In the lake is an elevated island, on which a famous monastery is built. Krapf estimated its elevation at 5000 feet above the sea-level, and found the climate very agreeable. The country of the Yejjoo is an immense plain, which inclines towards the east, as the courses of the rivers evidently show; but it becomes higher as it proceeds northward to the central table-land of Woffla. Several offsets from the higher country west of it advance some distance into the plain, and render it hilly in some places. In the southern district the climate is very temperate, and cotton and maize are grown to a great extent; but as we approach the table-land of Woffla a great degree of cold is experienced. Though the soil is in general fertile, with the exception of a few tracts which are covered with sand and have a scanty vegetation, a very large portion is a wilderness overgrown with acacia-trees and bushes, and the cultivated districts are few and far from one another. Water is very abundant, except in the most northern district, which lies contiguous to the table-land of Woffla.

The table-land of Shoa has two rainy seasons. January appears to be the only month in which the weather is always fine and no rain falls. The shorter rainy season commences in the middle of February and lasts till the end of April. In the beginning the rains are slight, but they increase in March and April, when showers occur nearly every day, and heavy rains with thunder and lightning are frequent. In May and the early part of June only a few showers fall, but towards the end of June the longer rainy season sets in, which lasts till the middle of September. In this season it rains every night, and often during the day, and the rains are generally heavy. After the middle of September only occasional showers occur, and a heavy fall of rain is a rare occurrence.

The table-land of Abyssinia is distinguished from all other elevated table-lands by the great depression of the valleys in which the watercourses are. Some of the rivers run for the greater part of their course in valleys many hundred and even thousand feet below the general level of the country: others are not much depressed in the interior of the high plains, but many miles before they reach the lower country they begin to sink deeper; and where they leave it, their level is many hundred feet below the contiguous plains. It is probable, from the formation of the valleys, that the waters themselves have scooped out these deep and narrow depressions. As such a phenomenon is not observed in other table-lands of the globe, we must suppose that the rocks of which the elevated masses are composed are of a softer nature than elsewhere, and that they more easily yield to the force of running waters. These rivers exhibit another remarkable phenomenon in their quick rise and fall. After a heavy fall of rain the Takkazie rises five feet in one hour; and when the rains continue, it rises to 20 feet above its common level. But in one or two days the water has run off, and the river fallen to its common level. A similar phenomenon has been observed in other rivers. Dr. Beke states that after a shower of rain he saw the waters of a small river, the Gáua, come down from the mountains in one large wave, which raised the level of the river at least one foot as it descended. In June, 1842, the Abái suddenly rose three feet, in consequence of a violent storm which had happened the previous night; but the following day it fell again to its level. When travellers come to a large river, and find that it has risen so as to be unfordable, they are not embarrassed by this circumstance: they have only to wait twenty-four hours, or a little longer, when it becomes again fordable. The Abái is passed at two places by bridges, but there are no other bridges in the country.

Productions.—Though Abyssinia is situated between the tropics, its productions rather resemble those of the temperate zone, to which its climate, with the exception of the rainy season, bears a great resemblance, on account of the elevation above the sea-level. This is especially the case with the vegetable products. None of the grains of India are found here, with the exception of the *neug* (Sesamum orientale), a small grain which resembles the *raggy* of the table-land of Dekkan; but it is scarce. The other grains are wheat and barley, the latter grown most extensively, as it is the only corn given to horses and mules: oats are not cultivated, though large tracts in the Plain of Miécha are covered with wild oats. Indian-corn is grown in many places, especially on the lower parts of the table-land, as in the Plain of Gondar and in the country of the Yejjoos; and in some places *durrha* (Holcus sorghum) and *tokussa*, a kind of Eleusine. From this grain two crops are annually obtained as a general rule, especially where the fields can be irrigated. The leguminous vegetables which are most extensively grown are teff (Poa Abyssynica), beans, lupines, lentils, and a kind of vetch, which is eaten. A plant, *nuck* (Polymnia frondosa), is much cultivated for the seed, from which a bad oil is extracted. Garlick, onions, and capsicums are extensively used. Our flax-plant is cultivated in a few places, but another species is grown exclusively for the seed, which, when parched, is eaten by the lower classes. There are some small plantations of coffee, but the produce is not valued, because it is much inferior to that which is imported from Kaffa. Cotton is grown in the lower parts of the country, as in the provinces of Shiri, Waldubba, and Walkkeit, and in the country of the Yejjoos. Excellent grapes grow at the foot of the rocky masses to the east of Lake Zana.

The most useful wild plants are the sycamore; the Rhamnus nabia, whose nuts are edible; and Phytolacca abyssinica, the seed-pods of which are used as soap.

The domestic animals consist of horses, cattle, sheep, goats, mules, and asses. The Sanga oxen are found in the countries south of Antálo, and are remarkable for the great size of their horns, which sometimes are nearly four feet long. There is also the black sheep, from which the skin called lovisa is obtained, and which has been mentioned before. The Abyssinians keep a strong and swift kind of dogs, which are employed in the chace.

Wild animals are very numerous: there are lions, elephants, and buffaloes. Tigers are not found, but several species of leopard, as the common leopard and the black leopard, the skin of which fetches a high price in the country, and is worn by the governors of provinces. There are also lynxes, lion-cats, leopard-cats, and the wild cats. There are also hyenas (Hyæna crocuta), a small species of wolf, a small species of fox on the table-land of Woffla, and the jackal.

The larger quadrupeds are only found in the wildernesses which lie along the northern and southern boundary of the country. Elephants and buffaloes are very numerous; the two-horned rhinoceros is not so common; and giraffes appear only along the northern border. Shields and whips are made of their skin, and the long brush of wiry hair at the end of their tail is used as a fan. In the low country at the base of the table-land of Shoa a wild animal of the ox kind is found, which is called béeza, and has erect horns. It has not yet been described. In the same country there are zebras, quaggas, wild asses, and elephants. There are several species of antelopes, among which the madoqua (Antilope saltana), the smallest of the horned animals, not larger than an English hare, and the Antilope Sömmeringii. Two kinds of boars, the Phascochoerus Aeliani and another species, are common in some of the woods. There are various kinds of quadrumana, as Cynocephalus babuinus, the Cynocephalus hamadryas, and the Colobus guereza, Rüppel. Of smaller animals there are porcupines, rock-rabbits, ground-squirrels, ferrets, polecats, and otters.

Fowls are generally kept. There are several species of eagles, the Gypaëtus barbatus, and also several kinds of vultures. On the high mountains of Semien are Alpine ravens (Pyrrhocorax graculus). Rüppel notices three kinds of parrots, Psittacus Levaillantii, P. Taranta, and P. Meyeri. In Tigré there are herons and hornbills. The Egyptian goose and a species of duck, with several other kinds of water-fowl, frequent the swamps and lakes. Guinea-fowls, red-legged partridges, quails, snipes, larks, and pigeons abound all through the country: among the latter is the Columba Abyssinica, whose beautiful yellow colour shades off into purple. There is also a beautiful species of muscicapa.

Hippopotami are abundant in Lake Zana and the larger rivers, where many are killed annually for their flesh and hides. Crocodiles are probably not found in the waters of Abyssinia. Bees are so common that honey is very abundant, and this prevents the importation of sugar. Locusts frequently lay waste the fields: they are most numerous on the table-land of Tigré: other parts of the country do not seem to suffer much from them.

Abyssinia is poor in minerals. Gold has occasionally been found. The mountains of Lasta are rich in iron-ore, which is worked, and appears to be of good quality. The great salt-plain which lies between the Red Sea and the table-land of Tigré belongs partly to the sovereign of Tigré, and immense quantities of rock-salt are annually taken from it and imported to all parts of the country, as it is not only used for culinary purposes, but also as currency. [ADAL, P. C. S.] Large quantities of salt, taken from the salt lake Assal, are annually imported into Shoa, as salt is not found on the table-land. Sulphur is found at several places.

Population and Inhabitants.—Rüppel estimates the area of Abyssinia, exclusive of the countries which form the kingdom of Shoa, at about 270,000 square miles, or more than double the area of the British Islands, and assigns to Tigré half a million, and to Amhára, including the countries belonging to the Wollo Gallas and the Yejjoos, a million of inhabitants. But this estimate is certainly underrated. He had not an opportunity of seeing the best cultivated and most populous part of Tigré, the Plain of Antálo, nor the most densely peopled portion of Amhára, namely, the peninsula which is surrounded by the Abái. Looking at the accounts of Dr. Beke, who traversed the last-named country repeatedly and in almost every direction, one would suppose that this part of Amhára alone must contain at least a million of inhabitants. The countries which at present constitute the kingdom of Shoa have an area of about 12,000 square miles. They are tolerably well peopled, owing to the peaceful state in which they have lived for a century, and may contain a population of about half a million. We think therefore that the whole population of Abyssinia may amount to about three millions, but that it certainly falls short of four millions. The first estimate gives less than ten individuals to a square mile.

Rüppel distinguishes three different races among the inhabitants of Abyssinia. The bulk of the population belong to the Caucasian race, and in features do not differ from the Beduins of Arabia. They have an oval face, a pointed nose, and a well-formed mouth. Their lips are not thicker than those of Europeans, their eyes are lively, their teeth well set, and their black hair is either smooth or slightly curled. They are of a middling stature. They inhabit almost exclusively the northern parts of Amhára, and are also numerous in Tigré and in most of the southern districts of Amhára. The Falashas, or Jews, the Gamant, and Agows belong to this race, notwithstanding the different dialects which they speak. Another race is found mingled with them: it is more closely allied to the inhabitants of the interior of Africa, and is distinguished by a somewhat curved but not pointed nose, thick lips, and lengthened eyes, which are not lively, and by black but curly, almost woolly hair, which is very thick set. They are most numerous in the northern districts of Tigré, especially in Hamazien and the adjacent countries. The third race are the Gallas. Their face is round, their nose straight and short, but not pointed, and divided from the forehead by a depression. Their lips are rather thick, but do not resemble those of the negroes. They have small eyes, which are very lively, but deeply set in the sockets, and their body is rather stout and large. These Gallas constitute the majority of the inhabitants in the southern provinces of Shoa, and the countries west of the Lake Zana and the river Abái; they are also numerous in the armies of the other divisions of the country. There are no negroes in Abyssinia, except the slaves which are brought from the countries of the Shangallas, who inhabit the border countries to the west of the peninsula of the Abái. These negroes are the only blacks in the country. The colour of the other inhabitants varies from the darkest black-brown to the clearest light brown, and does not appear to be peculiar to any of the races.

The Abyssinians have a dead language, the Geez or Ethiopian language. [Ethiopian Languages, P.C.] The spoken languages are derived from it, and constitute, as it appears, four dialects, namely, the languages of Amhára, Tigré, Shoa, and of the Yejjoos. They are comprehended under the name of Amharic languages, and differ considerably from one another: but the people understand one another and do not need an interpreter. The language of Gondar is considered to be the purest Amharic. The language of the Gallas is radically different, and is spoken by the northern Gallas, who inhabit the elevated region which extends from the river Wanshit, an affluent of the Jamma, on the south, to the Bashilo river and farther on the north, and by the southern Gallas, who live on the highest part of the southern table-land of Shoa and the plains contiguous to the Hawásh river. There are also three other languages spoken in Abyssinia, which however are limited to a small number of people. There are two tribes called Agows. One of them lives near the western border in the province of Agaumider, which has obtained its name from them: and the other at a great distance on the western banks of the Tacazzie, and extends from the mountains of Lasta to the Plain of Tembien. We do not know if there is much difference between the languages spoken by these two tribes, but they differ materially from the Amharic. The languages spoken by the Falasha and by the Gamants, two tribes inhabiting the Semien mountains and the hilly country west of the table-land of Wogghera, are nearly identical; but they differ from the Amharic and Galla languages, according to the statement of Rüppel. He adds to these languages that of the Shangalla Takkazie, who inhabit the wilderness north of Siré and Waldubba, and who according to his statement are not negroes, but resemble the inhabitants of Hamazien, or the second race noticed above. But the Shangallas, who live along the western border of Agaumider, are true negroes, and speak a different language.

The Abyssinians are Christians, but their tenets differ materially from those of the Roman and Greek churches, so that their religion must be set down as the fourth great section of the Christian community. They are called Coptic Christians, and the head of their church, named Abúna, is ordained and sent out by the archbishop of Alexandria. Respecting their rites and manners see P.C. vol. i. p. 57 and 58. A great number of the Gallas, as well among the Wollo as among the southern tribes as far as they are subject to the king of Shoa, have also embraced Christianity. In every part of Abyssinia there are many Mohammedans. They are numerous among the Yejjoos and Wollo Gallas, and their number is on the increase. The Falashas in the Semien Mountains and the Gamants in the hilly region west of the table-land of Wogghera are a set of Hebrews, who have adopted a few ceremonies of the Christian community. Many Falashas are settled at Gondar, where they inhabit a separate quarter of the town called Falashabad. The Gallas who inhabit the banks of the Hawásh are still heathens, and so are the Shangallas. On the shores of Lake Zana live the Waitos, who are considered heathens, but they conform to most of the rites of the Abyssinian Church, except that they do not observe the frequent fastings, which amount to 192 days in the year, and some other observances of that community.

Political State and Towns.—For more than a century Abyssinia has been in a state bordering on anarchy. An emperor, or as he is called a Negus, is the sovereign of the whole country, but his authority is only nominal, and his revenues consist of an annual pension of three hundred dollars, and of a share of the excise levied on the butter sold in the market of Gondar. The governors of the provinces have usurped his authority in their respective districts and transmitted it to their children. They are almost continually in a state of war with one another, and the stronger expels his neighbour from his possessions and gives them to his relations who are most in favour with him. The governor in possession of the town of Gondar creates the emperor. How rapid the political changes are, appears from the fact, that a few years ago eight persons were alive, each of whom had been emperor, and some for only a few weeks or months. The country and population suffer greatly by these wars, to which is owing the destitute state of the greatest part of the country, but especially those parts of Amhara which lie north of Lake Zana, and are usually the theatre of protracted wars.

Under such circumstances it would be useless to attempt to give any account of the political divisions of the country. What was true three or four years ago, is probably not true now. It will also be conceived, that there is hardly a place which deserves to be called a town in our signification of the word. The manufacturing industry is too small to collect a number of individuals in one place, and each usurper chooses a new place for his residence, according to his political views or his caprice. When a place has for some years been the residence of a chief, it acquires importance, but its ruin begins with his death. Thus the town of Antálo in Tigré, under the wise and energetic government of Ras Welled Selassé, had so much improved, that when Salt was in the country (1810) it had a population of 8000 inhabitants, but since his death (1816) it has fallen to decay; even Adowa, though a commercial place, is going to ruin. The town of Gondar alone still retains some importance, though it has greatly declined from its condition when the emperors had not yet lost their authority. The most important town in the Peninsula of the Abái is Burie, the capital of Damot, but as the governor of the province has lately transferred his residence to Gúdera, it will probably soon share the fate of the other towns. The towns of Yaush and Yejubbi, also in the Peninsula of the Abái, appear to be considerable places. They are inhabited by merchants, who have acquired some wealth by their business in the neighbouring market-place of Báso.

The kingdom of Shoa forms an exception. Though this state is of modern date, its internal organization appears to have acquired a considerable degree of stability. It has also acquired a power which renders it superior to all the neighbouring chiefs, and enables it to keep them in check. The authority of the king of Shoa extends over the country north of the Hawásh from its source to its junction with the river Kassam (40° E. long.). From the last-mentioned place the eastern boundary of Shoa appears to run northward from 10 to 15 miles from the ascent of the table-land, until it reaches the river Berkona, an affluent of the Hawásh. The Berkona runs along the northern boundary on the east of the table-land. On the table-land itself the boundary is formed by the river Waiat, an affluent of the Wanshit, by the last-mentioned river and its recipient the Jamma. The western border runs along a line drawn from the point where the Jamma falls into the Abái to the source of the Hawásh. Among the Galla tribes who inhabit the plains along the banks of the Hawásh, and those who reside along the western boundary-line, the authority of the king of Shoa has not yet been firmly established, but the other parts of the country are completely subjected to his sway.

The capital of Shoa is Ankóbar. It is situated on the ascent of the table-land, not far from its upper edge, and 8198 feet above the sea-level. This town is built on two wooded hills, of which the higher and northern one is hedged in with long poles connected by branches of trees, like palisadoes, and on the summit is the king's residence, built of stone, with a thatched roof and numerous outbuildings. The southern hill is clustered with houses, chiefly of wood with thatched roofs, and they are generally surrounded by a garden, and disposed round the cone in a spiral form. The population may amount to between 8000 and 10,000, exclusive of the king's household, which consists of more than 1000 persons. The climate of this place is compared with a fine spring or autumn in England; the thermometer during August and September never rises above 63° nor falls below 46°.

Manufactures.—When it is considered that the elevated table-land of Abyssinia is very difficult of access from the sea-side, and that therefore the intercourse between its inhabitants and foreigners cannot be very great, we must admit that they have made considerable progress in manufactures. They do not indeed excel in the fabrication of any article, as they have had no instruction from other nations, to which circumstance the manufactures of Europe in a great part owe their perfection. The best article is tanned skins, which are used for bedding or for tents, an important article on account of the numerous caravans. Shields made of the hides of elephants or rhinoceroses are also good. The iron articles come next. Axes and ploughshares as well as spear-heads are made at several places, but knives, sword-blades, scissors, and razors are only made at Gondar and at Kiratza, a town situated on the eastern shore of Lake Zana, which contains 5000 inhabitants, and is under the authority of the clergy, which circumstance protects it effectually against the evils of war. At Gondar there are guns made, but only by some Greeks, not by the natives. Large quantities of coarse cotton-cloth are made in several parts of the country by women, especially by the Falashas, and a finer kind with a red or blue border for the more wealthy classes of society. The silk manufactures are limited to some embroidery, made by Mohammedans and worn by their women, and to blue strings, which are worn on the neck by all Christians, as a mark of distinction from Mohammedans or heathens. Only a coarse stuff is made from the wool and hair of the black sheep and goats, which is also employed in making a kind of counterpanes. Coarse black pottery is made in every part of the country. Printing has not yet been introduced into Abyssinia, and the copying of manuscripts forms a distinct branch of manufacturing industry. Rüppel states that they have brought it to considerable perfection. Their handwriting is very fine. They use a kind of cane as a pen, and always copy on parchment. These manuscripts are embellished with pictures, which at present are indifferent; but Rüppel saw some which were made eighty years ago, which were much superior. He praises also the tasteful manner in which the binding of these manuscripts is executed.

Commerce.—As Abyssinia does not border on the sea, but is separated from it by the countries of the Danakil or Adál, it has no immediate intercourse with sea-faring nations, but its products are carried either to Massówa (15° 40′ N. lat.) on the Red Sea or to Tajurrah (11° 50′ N. lat.) built on an inlet of the Gulf of Aden. Massówa is about forty miles from the eastern boundary of Abyssinia, and through this place the maritime commerce between Tigré and Amhára and other nations is carried on. It is accordingly the harbour of these two great divisions of the country. Tajurrah is more than 200 miles from the nearest boundary-line of Shoa, and 372 miles from Ankóbar, by the caravan road. The kingdom of Shoa exports its productions through this harbour.

Lord Valentia and Rüppel have given some account of the trade of Massówa. Rüppel stayed there nearly eight months, and got the following information about the exports :—

Articles.	Value Aust. dol.		£
2000 slaves of both sexes . .	120,000	or	24,000
150 horns of musk or civet, at 30 ounces, at 2 dollars per ounce	9,000	or	1,800
300 pieces elephants' teeth of different sizes, at 20 dollars each	6,000	or	1,200
700 hundredweight of wax, at 20 dol.	8,000	or	1,600
100 hundredweights of coffee from Enarea and Kaffa, at 10 dol.	1,000	or	200
Tanned leather and skins, amounting to . . .	1,600	or	300
2000 hundredweight of butter, at 8 dol.	16,000	or	3,200
Honey, wheat and other kinds of grain	6,000	or	1,200
Gold, about 2000 ounces, at 20 dol.	40,000	or	8,000
Khéle, a spice which grows only in Enarea, and which goes in considerable quantities to India	1,000	or	200
	dol. 208,500	or	£41,700

All articles imported into Massówa go to Abyssinia, with the exception of a large quantity of rice from India, dhurra (Holcus sorghum) from Yemen, and dates from Basra, which are consumed in the town. The articles sent to Abyssinia are raw cotton and pepper, blue and red cotton-cloth, the thread of which are unravelled and woven into the borders of th cloths of native manufacture, raw silk dyed blue, white cambrics, and a small quantity of glazed silks and some commo velvet. These articles are imported from India by the way of Mocha. Articles from Egypt are imported by way o Jedda. These are glass pearls, linen shirts, common red cloth some articles of glass, common razors, sword-blades, spic celtica, small parcels of red or green marocco leather, zinc and common Turkish carpets. From Basra are importe bottles of a peculiar shape, of which large numbers are use in Abyssinia, and a large quantity of Persian tobacco.

The bulk of the goods imported into Abyssinia is probabl consumed there, but some of them find their way into the interior of Africa to supply countries and nations with whos names we are hardly acquainted. They are exchanged for th produce of these countries at Báso, a market-place (not town) situated in Gojam, 15 or 18 miles from the most southern bend of the Abái river and a few miles from the towns Yejubbi and Yaush, where many merchants reside. Dr Beke has given some account of this trade. The market held weekly during the season, which lasts about eight months for during the other four months the river cannot be forded The merchants bring from the southern countries slaves, ivory coffee, civet, gold, cloth, iron, and cattle. While Dr. Bek was there the number of slaves imported amounted to 16 individuals of both sexes, and he estimates the weekly averag at 200, which gives 7000 slaves as the yearly impor They are mostly children, male and female, from the Gall countries, and other countries south of them, as Kaff Enárea, and Jánjero. Many of them are Christians, others ar Mohammedans, but the greater portion are pagan Gallas Their colour is generally lighter than that of the Abyssinian and some are not darker than the natives of Southern Europe A smaller portion consists of Shangallas, or negroes from th low country to the south-west. The number of loads of ivor which was imported when Dr. Beke was there amounted t 75: a load consisted in some cases of one, most frequently o two, and sometimes of three, four, and even more tusks. Th quantity however was stated to exceed the weekly average whilst the number of slaves was universally admitted to fa much below it. The ivory comes principally from Enáre and the gold, civet, and coffee, from Enárea and Kaffa; th other articles come from the Galla countries. Dr. Beke doe not mention the spice called *khéle*, which Rüppel enumerate among the articles of export from Massówa: Rüppel state that it is imported from Enárea.

On comparing the imports from these southern countri with the export trade of Massówa, it is evident that mo of the exported articles and also most of the imported are no of Abyssinian growth, and that this country produces ver few articles for foreign commerce. Nearly all the merchant of the country are engaged in this transit trade. The unsettled state of the country obliges them to travel in cafilahs and they always keep to the same routes. Gondar may b considered as the centre of this commerce, and with the exception of the clergy and slaves almost all its inhabitants ar engaged in this trade. Two caravan-roads lead from Gonda to Massówa. One traverses the table-land of Wogghera, an the pass of Lamalmon crosses the Takkazie in Shiré, and continues through Axum and Adowa to the descent of the table land. The other, having traversed Wogghera, turns eastwar and passes over the Semien mountains by the Selki pass. I crosses the Takkazie at Ber Ágow, and continues to Adow where it falls into the road before mentioned. Two carava roads lead from Gondar to Báso. The most western ru along the eastern shores of Lake Zana, crosses the Abái at th bridge which is below the cataract of Aláta, traverses th plain of Miecha and the western portion of the Talba Wah range, passes through Dembecha in Damot, and thence continues to Báso. The other lies more to the east, goes through th commercial town of Dérita, which has not yet been visited b Europeans, and the market-place of Bada, whence it continue over the Broken Bridge on the Abái to Móta and thence Báso. There are several other caravan roads by which interior commerce is carried on. There are a certain num of Austrian dollars circulating in Abyssinia. Rüppel thi that they do not amount to a hundred thousand. The c mon currency consists of pieces of rock-salt in the shape of whetstone, and weighing between 19 and 20 ounces. They taken from the great salt plain, which properly lies in A but partly belongs to Tigré [ADAL, P. C. S.], and are carried the merchants of Antálo to Sócota in Waag, whence they f their way to the southern provinces of Abyssinia. These pieces of rock-salt are called *amole*.

History.—There is a tradition in Abyssinia, generally credited, that the original inhabitants of that country, many centuries before the Christian æra, were converted to the Jewish faith, and that the founder of the first dynasty of their kings was Menilek, a son of Solomon and a queen of Saba. The Abyssinians were converted to Christianity in the time of the Emperor Constantine by some missionaries sent from Alexandria. At that time the town of Axum was the seat of the empire, and most of the antiquities which still exist at that place must be ascribed to that period. The power of the emperors seems then to have been well established, and they got possession of the low country which divides the table-land from the Red Sea, and at present forms the country of Adál. In the sixth century they had so increased their power that they were able to send an army to Arabia and to conquer a part of Yemen. This was the period of the greatest political power of Abyssinia. Seventy years afterwards the Abyssinians were deprived of Yemen, probably by the Arabs, whom Mohammed had inspired with the zeal of propagating his doctrines, and with the spirit of conquering all neighbouring nations. The Arabs soon attacked Abyssinia itself, and though they did not succeed in conquering it, they took possession of Adál, and converted its inhabitants to the Islam. It appears that after this time great disorder crept into the internal affairs of the empire, for in the year 925 a Jewess, called Sague, overthrew the reigning dynasty and destroyed Axum. The descendants of the royal family fled to Shoa. For more than three hundred years the country appears to have remained in a distracted state, until the Emperor Iqon Amlaq recovered the whole kingdom, about 1255, aided by the abilities of an ecclesiastic named Tecla Haimanot. In the following three centuries the country appears to have remained in an improving state, and even to have acquired a part of its former power, as in the thirteenth century it is said to have again got possession of the southern part of Adál, which however it lost soon afterwards. Towards the end of the fifteenth century Pedro Covilhão, an agent of the court of Lisbon, visited the country, and this circumstance saved the empire from destruction; for in the beginning of the fifteenth century Granie, or Gragne, a sultan of Hurrur, or Adál, had, like Gengis Khan, succeeded in gathering under his banners the nomadic tribes of Danákil and the Gallas, and made frequent incursions into Abyssinia. The emperor sent an ambassador to Lisbon to get aid from the king of Portugal, at the same time promising unqualified submission to the pope. Four hundred soldiers, a considerable supply of arms, and some ecclesiastics were sent off, and they arrived in time. In 1540 Granie was defeated, by the assistance of the Portuguese soldiers, in the Plain of Dembea, and lost his life. The empire was saved, but the southern provinces were lost. By these events the seat of the emperor was transferred from Shoa to Gondar. The mission of the Portuguese ecclesiastics however appears to have laid the foundation of that unsettled state of the country into which Abyssinia fell soon afterwards, and in which it has continued to the present time. The Roman Catholic priests were men of education, of knowledge, and character, and soon got into favour with the emperor and his family, who were inclined to renounce the tenets and rites of the Coptic Church, and to adopt those of Rome; but the people and the ecclesiastics opposed this innovation. For some time the matter was managed with prudence, but the ill-timed zeal of some Roman Catholic missionaries brought about a crisis: the people rose in rebellion against the emperor, and continued to resist for many years. After a long struggle between the sovereign and his subjects, the emperor was obliged to give way, and the Roman Catholic priests were expelled in 1632. During this period of anarchy the governors of the provinces made themselves independent, and thus arose the unsettled state of the country which we have already noticed.

It has been stated that after the defeat and the death of Granie, the southern provinces were not recovered; but it appears that the Abyssinian Christians maintained a footing in the elevated regions that border on the steep ascent from the table-land, and that these chiefs considered themselves dependent on the emperors. One of them however, called Nágasi, claimed an independent authority, and became the founder of the kingdom of Shoa. Travellers who have lately visited that country have not yet had time to acquaint us with the history of its dynasty. Krapf however states that the present sovereign is the seventh king from Nagási. It would therefore appear that Nagási lived at the end of the seventeenth or the beginning of the eighteenth century. His successors began to enlarge their territories; and the second of them, Abiye, took Ankóbar from the Gallas. In one century or a little more they have extended their authority over a country covering at least 12,000 square miles; and the order which they have introduced into the administration and the army seems to promise them a rapid and certain success in their wars with the neighbouring Galla tribes.

(Bruce, *Travels to discover the Source of the Nile;* Lord Valentia, *Voyages and Travels to India, Ceylon, the Red Sea, Abyssinia, and Egypt;* Salt, *Voyage to Abyssinia and Travels into the interior of that country;* Pearce, *Life and Adventures*, by Hall; Gobat, *Journal of a Three Years' Residence in Abyssinia;* Rüppel, *Reise in Abyssinien;* Isenberg and Krapf, *Journals*, detailing their proceedings in the kingdom of Shoa, &c.; Kirk, *Report on the Route from Tajurra to Ankóbar*, in the 'London Geographical Journal,' vol. xii.; Beke, *Communications respecting the Geography of Southern Abyssinia*, and his *Route from Ankóbar to Dérná*, in 'London Geographical Journal,' vol. xii.; Beke, *Continuation of Routes in Abyssinia*, in 'London Geographical Journal,' vol. xiv.)

ACANTHODE'RMA, a fossil genus of fishes from Glaris. (Agassiz.)

ACANTHO'DES, a genus of fossil Ganoid fishes, established by M. Agassiz. The species occur in the carboniferous strata near Edinburgh. (Agassiz.)

A'CANUS, a fossil genus of fishes, from Glaris. (Agassiz.)

ACCELERATION AND RETARDATION OF TIDES are certain deviations of the times of consecutive high-water at any place from those which would be observed if the tides occurred after the lapse of a mean interval. The interval between the culmination of the moon, or the occurrence of her principal phases, and the nearest time of high-water, is also called the retardation of the tide.

The tides are caused by the attractions exercised both by the sun and moon on the waters of the earth; but the effect produced by the moon exceeds that which is produced by the sun, and the difference is such, that the phenomena of the tides depend principally on the former. The mean interval between two consecutive returns of the moon, above and below the pole, to the meridian of any place, is 24h. 50m. 28·32s.; and since, neglecting all causes of irregularity, two lunar high-tides occur in that time, the mean interval between two consecutive lunar tides should be 12h. 25m. 14·16s.; while the mean interval between two consecutive solar tides should be 12h. Hence, if at the time of a conjunction or opposition of the sun and moon, the high tides which are produced by the actions of the luminaries separately were coincident, the next lunar tide would be retarded with respect to the next solar tide, by 25m. 14·16s., that is, by the excess of half a lunar day above half a solar day. These retardations continuing daily, the lunar high-water would coincide, at the time of quadrature, with the solar low-water, and thus produce the neap or diminished tides; after which, the like retardation continuing, the solar and lunar high-waters would again become coincident at the times of syzygy, and so on. The observed daily retardation of the lunar high-tides varies however according to the position of the moon with respect to the sun, to the moon's declination, and to the distance of that luminary from the earth. At Brest, when the sun and moon are in conjunction or in opposition, at the summer or winter solstice, the retardation is equal to 40m. 51·69s., and at the time of the equinoxes 37m. 38·15s. Again, when the sun and moon are in quadrature at either solstice, the retardation is 1h. 7m. 27·49s., and at the time of the equinoxes 1h. 23m. 16·34s.

If the earth were a solid of revolution, and were covered by the sea, the high-tides produced by the sun and moon separately would, at any place, occur at the instants when those celestial bodies are on the meridian of the place; but such is not the fact in the actual condition of the earth; and local circumstances produce, at different ports, great differences in the intervals between the culmination of the sun or moon and the time of high-water, even on the days when the luminaries are in conjunction or opposition. The interval between the instant that the sun passes the meridian of a place and the occurrence of the solar high-tide, is found to be greater than the interval between the transit of the moon and the occurrence of the lunar high-tide; and this acceleration, as it is called, of the lunar tide, is with much probability ascribed by Dr. Young to a difference in the resistances experienced by the waters on account of the different velocities which ar communicated to them by the separate actions of the sun and moon.

It should be observed however that at Ipswich the time of high-water is nearly coincident with the time at which the moon passes the meridian of that port; and both at Glasgow and Greenock the high-tide generally precedes the transit (Mr. Mackie's *Report*, at the seventh meeting of the British Association); but such phenomena are of rare occurrence, and at almost every place the high-tide occurs some time after the moon has culminated.

From a series of observations continued during sixteen years, at Brest, La Place, taking the excesses of the height of the evening tide above that of the morning for the day of syzygy, for the day preceding it, and for four days following it, has ascertained that at the syzygies which occur about the vernal and autumnal equinox the highest tides at that port take place 1·48013 days after the instant of the conjunction or opposition; and at the syzygies which occur about the summer and winter solstices they take place 1·54684 days after conjunction or opposition. Again, taking the excesses of the height of the morning tide above that of the evening for six days, as above, he ascertained that at the quadratures which occur about the equinoxes the highest tides take place 1·50964 days after the instant of quadrature, and at the solsticial quadratures 1·51269 days after such instant.

Mr. Airy ('Tides and Waves,' *Encycl. Metrop.*) observes that these retardations cannot be accounted for by delays in the transmission of the tide-waves, since no cause for such delay can be imagined to exist in the Southern Ocean, where the waves are formed; and it is known that the time of high-water at Brest is only fifteen hours later than at the Cape of Good Hope: he conceives therefore that the retardation must be ascribed to friction. By taking the means of the daily retardations of the morning and evening tides at Brest, La Place found that at the equinoctial syzygies such mean retardation was equal to 37m. 38s.; at the solsticial syzygies, 40m. 52s.; at the equinoctial quadratures, 83m. 16s.; and at the solsticial quadratures, 67m. 27s.

From a series of observed heights of the tides, Sir John Lubbock has determined that the highest tides occur at London 2·013 days after the conjunction or opposition of the sun and moon; and at Liverpool, 1·68 days. (*Phil. Trans.* 1831, 1835.) Also, from the observed heights, Dr. Whewell has found that the highest tides occur at Bristol 1·667 days after the syzygies; and at Dundee 1·639 days. (*Phil. Trans.* 1838, 1839.) On the supposition that the mean retardation of the tide at London at the times of syzygy is 2·459 days, Mr. Airy has computed the moon's true hour angle west of the meridian, at the time of high-water, for every half hour's difference in the time of her transit; and from the table it appears, that when the moon passes the meridian of London at noon (that is, at the time of conjunction), that angle, in time, is 1h. 57m. 17s.; when it passes at 3 P.M., the angle is 1h. 10m. 45s.: at 6 P.M., or at quadrature, 0h. 41m. 17s.; and at 9 P.M., 1h. 55m. 29s. The hour angle is the greatest at 10½ P.M., when it is equal to 2h. 9m. 55s.; and at 11½ P.M., or nearly at the time of opposition, it is 2h. 3m. 9s.: all these times are found to agree very nearly with the results of observation. From such results it is ascertained that, on the days following the times of syzygy and quadrature, the intervals between the time of the moon's transit and the instant of high-water are nearly equal; but from conjunction to the first quarter, and from opposition to the third quarter, the intervals are less than on the days of syzygy and quadrature, or the time of high-water is accelerated; while from the time of the first quarter to that of full moon, and from the third quarter to the new moon, the interval is greater, or the time of high-water is retarded. The time first mentioned (1h. 57m. 17s.) is that which is called the Establishment, at London; but Dr. Whewell recommends that the mean of the times (1h. 25m. 35s.), which he calls the mean, or correct, establishment, should be used in preference, because it differs less, on any day, from the vulgar establishment.

From Dr. Whewell's paper in the 'Philosophical Transactions' for 1836, we find that at Liverpool, when the moon passes the meridian at 30m. P.M., her hour angle at the time of high-water is 11h. 18m. 16s.; when the hour of transit is 6½ P.M., the hour angle is 10h. 40m. 52s.; and when it is 11½ P.M., the angle is 11h. 33m. 36s. The mean, or correct establishment, at that port, is 11h. 6m.

The acceleration and retardation of the times of high-water must evidently depend on the distance of the moon from the earth, and they are presumed to be proportional to the difference between the actual and the mean horizontal parallax o the luminary: this is called the parallax inequality of th tides; and La Place has determined, for the lunar tides, tha the ratio of the daily variations, when the moon is in apogeum and in perigeum, is nearly as 2227 to 2899. He estimate the variation at 9m. 26·4s. for a change equal to one minut in the moon's apparent semidiameter at the times of conjunc tion and opposition, and at one-third of that quantity at th times of quadrature. Corresponding variations, but less i amount, take place with respect to the solar tides.

ACCIDENTAL COLOUR is a name given to that whic an object appears to have when seen by an eye which, at th time, is strongly affected by some particular colour.

The colour observed in a natural body, when the eye is i the ordinary state, depending on the figure or disposition of th particles of the body, by which they transmit to the eye in th greatest abundance those rays which give rise to the perceptio of that colour; it follows that such colour is the most vivid whe the object is beheld by rays of that one only of the three, o seven, primary or homogeneous colours: and since the ray which actually arrive at the eye from any object are blended with those which proceed from surrounding objects, it follow that almost every tint observed in ordinary circumstances is, in a certain degree, an accidental colour.

Particular cases in which remarkable accidental colours were formed appear to have been long since observed; and there is a passage in one of the chapters of the 'Tratato dell Pittura' by Da Vinci, in which, as a reason why, on a white wall, the shadows produced by the setting sun appear to be blue, it is stated that the reflexion of the azure tint of the sky becomes sensible in the shadow because the part of the wall on which it falls does not receive the red light of the luminary. The variations produced by causing the colours observed in the shadows of small objects to fall upon one another were noticed by Maraldi; and Dr. Jurin (Treatise on distinct and indistinct vision, in Smith's *Optics*) described the apparent images produced by looking intently, for a time, at a black object on a white ground and at a white object on a black ground. But Buffon was the first who made a series of observations to ascertain the colour of the image of which the mind acquires a perception when the eye has been for some time directed to an object of some particular colour; and it is he who gave the name of accidental colours to those which are so perceived.

In a 'Mémoire' presented to the Académie des Sciences i 1743 he gives an account of his observations, the substance o which is, that when the eye had been, for a certain time directed steadily to a square spot of one of the following colours, red, yellow, green, blue, and black, the object being placed on a white ground, there was seen about the spot fringe or border of one of the colours in the following series green, blue, pale purple, pale red, and white, each of which in order, is the accidental colour of the corresponding colou in the former series. Immediately afterwards, on directing the eye to a different part of the white ground, there appeare upon it a square spot of the same accidental colour, the whit spot being considerably brighter than the ground.

The subject of accidental colours was pursued by the Jesui Scherffer ('Institutionum Opticarum partes quatuor,' 1775) and he recommended that, except when the object viewed wa black, that object should be placed on a black ground: in orde that, with less fatigue to the eye, the accidental colours migh be more vivid when the eye was directed to the white groun on which they were to be perceived. Scherffer made observations with coloured spots on grounds of different colour from which he ascertained, at the same time, the accidenta colours of the spot and of the ground; for example, on con templating a red square placed on yellow paper, and the turning the eye to white paper, he found that the latter was o a blue colour, and that on it appeared a square coloured green

Buffon, continuing to look at one of the coloured spot during a longer time than was necessary to produce th border above mentioned, observed that the colour of the spo itself became less vivid, that the spot subsequently took th form of a cross, and, finally, that of a narrow rectangle: thes appearances, which have been ascribed to the unsteadiness o the eye, have not since been observed. A border of accidenta colour is constantly observed about an object when it has bee for a time viewed intently; and in order that, by rendering it insensible, a coloured object may be seen as distinctly a possible, it has been recommended that it be painted or forme on a ground whose natural colour is similar to that of the acci dental colour peculiar to the object.

In the 'Novi Commentarii Petrop.' tom. x., M. Æpinus has described the perceptions which resulted from looking at the sun when behind thin clouds near the horizon; from which it appears that the impressions directly excited by the rays of the sun change, after a short time, into those which give rise to the perception of yellow, and afterwards, successively, into such as produce green and blue. On ceasing to look at the sun, and shutting his eyes, there appeared a spot irregularly round, with a red margin, and the interior of which was a pale yellow. Afterwards, on opening his eyes and looking at a white wall, a spot of the like form appeared on the latter, but the interior was red or brown, and the border a sky-blue. On again closing his eyes, the appearances were the same as those first observed; and on opening them a second time, the form of the spot was still the same, but its colour was green. Continuing thus to shut and open his eyes, alternately, the colour of the spot was found to change successively to reddish-green, bluish-green, and blue. It is remarked that these changes in the accidental colours are similar to those which take place in natural colours, when blue, in increasing quantities, is mixed with yellow; the result being first green and at length blue; and the same may be inferred from a curious experiment of Scherffer. That philosopher placed close together, on black paper, two square spots, of which that on the left hand was yellow, and the other a bright red: having turned his eyes, without moving his head, from one to the other alternately several times, he looked directly at a white wall: when there appeared upon it three squares close together, of which that on the left was of a violet colour, that in the centre was a mixture of green and blue, and that on the right a bright green. The apparent colour of the middle square is accounted for by the union, on the same part of the retina, of the accidental colours of the yellow and red, of which the former is violet and the latter green.

There is a paper on accidental colours, by Dr. Darwin, in the 'Philosophical Transactions' for 1786.

The explanation given by Hassenfratz of accidental colours, in general, is that the eye being directed to a coloured spot, the part of the retina on which the image of the spot is formed becomes thereby weakened, so as to be in a great measure insensible to the action of rays of that particular colour; and thus, on the eye being afterwards directed to a white ground, it receives sensible impressions only from the rays of the remaining colours in the pencils of white light. There is consequently apprehended an image similar in form to the spot on which the eye was first directed, but of a magnitude depending on the distance of the eye from the ground on which it appears, and of a colour which is complementary to that of the spot itself. [COLOURS, COMPLEMENTARY, P. C. S.]

ACCOMPLICE. [APPROVER, P. C.]

ACCORDION, a musical instrument of the pneumatic class, which came into England, from Germany, about the year 1828.

The Accordion is in the form of a small box, varying from eight to fifteen inches in length, four in width, and, when closed, five in depth. The interior exhibits a row of very small elastic metallic laminæ, or springs, fixed at one end in a plate of metal, so that they may vibrate freely. The upper and lower parts of the box, or machine, are united by a folding apparatus, or bellows, which supplies the air required to put the springs into vibration, and to these the air is admitted by means of valves acted on by keys, in the manner of an organ. There is also a very simple contrivance by which a base note, or drone, may be added, at the discretion of the performer. These beautiful instruments vary in size and in capabilities: the compass of the most complete is from G the fourth space in the base staff, to E the seventh additional space above the treble, including all the semitones. Hence the Accordion is not limited to melody, but can produce the most agreeable harmonic effects.

The principle on which the Accordion, and all other instruments of the kind, is founded, is fully explained by Dr. Gottfried Weber, in his *Leges Oscillationis*, &c. published in 1827, who refers as his source of information to an article by Strohmann, in the *Allgemeine Musicalische Zeitung* of 1813. This principle however had been fully set forth many years before by Professor Robison, in the 'Encyclopaedia Britannica,' under the term 'Musical Trumpet.' But Europe undoubtedly is indebted for the instrument to a people with whom originated—so far at least as we can trace—some of the most important inventions enjoyed by mankind. The distinguished French missionary to China, the Père Amiot, describes the *Cheng*, a small instrument consisting of laminæ, or springs, fixed in tubes, and acted on by the breath of the performer, which is in common use with the people of that extraordinary country. An engraving of it is given in the *Essai sur la Musique* of M. De Laborde, tome i. p. 129, and is a faithful representation of this curious sweet-toned instrument.

ACCOUNT STATED. This is the title of the common count in an action at law for the amount due upon a balanced account between the parties, the form of which is that the defendant was indebted to the plaintiff in a certain sum of money found to be due from the defendant to the plaintiff upon an account then stated between them, and in consideration thereof promised payment. This form should always be introduced in an action upon a simple contract for the recovery of a pecuniary demand.

It is not essential in support of this count that there should be reciprocal demands between the parties, or that the account should relate to more than a single debt or transaction. The original demand need not have been one recoverable at law. It may have been equitable, as in the case of a claim against an executor to recover a legacy to which he has assented, or in that of a member of a copartnership, who, though he cannot in general sue his copartner at law for his share of the profits, may do so after an account has been stated between them and a balance struck in his favour. It is necessary however that there should have existed some claim against the defendant, or some previous transactions in respect of which the account is stated, for an action cannot be brought in this form upon a mere agreement to pay a sum of money. It is usual in support of this count to give evidence of an original demand or a prior transaction, and of a balance struck and agreed upon, but it is sufficient in the first instance to prove an admission by the defendant to the plaintiff or his agent, that a certain sum was then due, without showing the origin or nature of the claim, or proving the specific items constituting the account. The account must have been stated before the action is brought. The admission, in order to charge a defendant upon an account stated, must be positive, unqualified, and unconditional, and must not be merely the admission of a debt, but either expressly or by reference the admission of a specific sum being due. If the plaintiff sues in a representative character, as in that of executor or assignee, he must show that the admission was made to him in that character. The statement of an account is it seems only presumptive evidence against the party who admits the balance to be against him, and does not preclude him from showing by clear evidence the existence of error in the account; unless in the case of an account actually settled by payment, which cannot be opened except upon proof of fraud. (Chitty *On Contracts*, 648, et seq., 3rd ed.)

In order to support this plea the statement of the account must be shown to have been final, and to have been in writing; but it is not essential that it should have been signed by the parties, and it will be sufficient if the account has been delivered and acquiesced in for such a length of time as to afford legal presumption of a settlement. A general release not under seal may be pleaded as a stated account. A plea of this kind must aver that the account is just and fair, whether error or fraud is charged by the bill or not.

In answer to a plea of a stated account the plaintiff may show either the existence of fraud, which will be a sufficient ground for opening the whole account, or that the account contains specific errors, which will enable him to surcharge, *i. e.* to show omissions for which there ought to be credit, and falsify, *i. e.* to show that there are wrong charges which ought to be deducted. (Daniel's *Practice in Chancery*, vol. ii. p. 186 et seq.)

ACCOUNTANT, a person who professes skill in mercantile accounts. In a commercial community occasions are constantly arising for the employment of accountants. They are generally appointed to examine the books of traders who have been compelled by embarrassment in their affairs to summon a meeting of their creditors; or they may be called in by a trader to investigate his accounts and to ascertain the state of his affairs. The collection of debts or rents, and the winding-up of affairs of persons deceased, or who have given up business, are matters often put into their hands. Appraisers and auctioneers frequently act as accountants. An accountant has no legal status, like a notary or an auctioneer or appraiser, who perform certain duties which none but they are allowed to discharge; but in the Bankrupt Act (5 & 6 Vict. c. 122) official assignees must be selected from persons in trade, or who are or have been 'merchants, brokers, or accountants.' The number of persons returned as accountants in the Occupation Census of 1841 was 4974 for Great Britain; of whom 4260 were returned in England, the number in London being 1108.

ACCOUNTANT-GENERAL, an officer of the Court of Chancery, first appointed under an act (12 Geo. I. c. 32) 'for securing the moneys and effects of the suitors.' The act recites that ill consequence and great prejudice already had and might again ensue to the suitors by having their moneys left in the sole power of the Masters of the Court. The bonds, tallies, orders and effects of suitors were, it appears, until the passing of this act, locked up in several chests in the Bank of England, under the direction of the Masters and two of the Six Clerks. The act confirms a previous order of the Court of Chancery for adopting a different system; and § 3 enacts that 'to the end the account between the suitors of the High Court of Chancery and the Bank of England may be the more regularly and plainly kept, and the state of such account may be at all times seen and known,' there shall be 'one person appointed by the High Court of Chancery to act, perform, and do all such matters and things relating to the delivering of the suitors' money and effects into the Bank, and taking them out of the Bank, &c., which was formerly done by the Masters and Usher of the Court.' The Accountant-General is 'not to meddle with the suitors' money, but only to keep an account with the Bank.' He attends several times a-week at the Bank and other places for the purpose of making sales, transfers, and acceptances of stock, according to the orders of the Court. The Bank receives moneys under a power of attorney from the Accountant-General. No one has yet been appointed to the office without being a Master in Chancery. The Accountant-General attends the public office in his turn as Master in Ordinary. The present Accountant-General, who was appointed in April, 1839, is the thirteenth who has filled the situation since the first appointment in 1726. The salary is 900*l.* a-year (650*l.* under 12 Geo. II. c. 24, and 250*l.* under 9 Geo. III. c. 19), and there is an allowance for stationery and other articles of 250*l.* under 46 Geo. III. c. 129, and 55 Geo. III. c. 64. His income is further increased by his salary as one of the Masters in Ordinary, which is 200*l.* under 5 Geo. III. c. 28, to which 400*l.* was added by 46 Geo. III. c. 129. He receives fees besides when attending the Public Office as Master; and has some other trifling emoluments. In addition to the above, the Accountant-General receives from the broker employed by him part of the broker's usual commission. In 1843 this amounted to a sum of 2314*l.* after deducting a sum of 150*l.* paid into the Suitors' Fund under 5 Vict. c. 5. The total emoluments of the Accountant-General in the above year were 3814*l.*

The total sum standing in the name of the Accountant-General on the 30th of April, 1841, was 40,957,839*l.*, of which above 39,000,000*l.* was invested in stock, and 1,759,629*l.* was in cash. (*App. to Report on Courts of Law and Equity*, No. 476, Sess. 1842.) The act 5 Vict. c. 5, § 63, directs the Accountant-General to cause to be laid before parliament every year an account showing the state of the Suitors' Fund and the Suitors' Fee Fund, which stand in his name. The Suitors' Fund consists of money and stock unclaimed, but which are open to claim at any time. On the 1st of October, 1842, this fund amounted to 26,299*l.* cash, and 2,869,213*l.* stock. The Fee Fund accrues from fees formerly payable to the different officers of the court for their own advantage. These fees amounted to 62,808*l.* in the year ending November, 1842. The salaries of the lord chancellor, the vice-chancellors, and other officers of the Court of Chancery are paid out of these two funds.

Before the passing of the act 5 Vict. c. 5, which suppressed the equity jurisdiction of the Court of Exchequer, there was an Accountant-General of that court; and in April, 1841, a sum of 2,730,862*l.* was standing in his name in the Bank of England. The account is now transferred to the Accountant-General of the Court of Chancery. The duties of the Accountant-General and Masters of the Exchequer are now performed by the Queen's Remembrancer.

There is an Accountant-General of the Irish Court of Chancery.

ACCUMULATION. [THELLUSSON, PETER, P. C., p. 305.]

ACCUMULATION OF POWER is a term applied to that quantity of motion which exists in some machines at the end of intervals of time, during which the velocity of the moving body has been constantly accelerated.

The simplest case in which there is such an accumulation of power is that of a heavy body, like the rammer of a pile-driving machine, which descends by the action of gravity during a certain time and impinges upon some object. At the moment of impact, supposing that the object struck does not move, the velocities of all the particles, which had gone on continually increasing during the descent, are destroyed, and thus a shock is produced immensely greater than that which would result from the mere pressure of the body. The battering ram of the antients, when, being suspended from some fixed point, it was allowed to swing by the action of gravity till one of its extremities struck the face of a wall, produced its effect in like manner by the power accumulated in it during its motion. In all such cases, the effect, if measured by the magnitude of an impression or indentation produced in the object struck, is, by mechanics, directly proportional to the mass in motion and to the square of the velocity at the instant of impact.

The accumulation produced by the continuous action of gravity, when a body has not far to fall, is commonly increased by that of a quantity of motion obtained by an exertion of muscular power. Thus a smith, when he would strike on an anvil with the greatest force, adds to the power of gravity on the hammer the accumulation of velocity arising from a whirling motion, in a vertical plane, which he gives above his head to the hammer before he allows it to descend.

In the old coining-machines, which, like those at present used, produced the impression on the metal by the power of a screw, a great accumulation of force was obtained by causing a number of men to turn the horizontal bars attached to the vertical shaft which carried the screw: by the pressure of the men against the bars, while several revolutions were made about the axis of the screw, an acceleration of motion during that time took place; and the accumulation was instantaneously spent upon the metal, in aid of the pressure arising from the power of the screw alone. The like accumulation of force is obtained, but far more efficiently, in the coining-press of the present day by means of its fly-wheel: the reciprocating motion of a piston connected with a steam-engine communicates, by means of a crank, a continuous circular movement to the fly, and at the same time a reciprocating rectilinear motion vertically to the cylindrical shaft (the stamper) on which the screw is formed. With half a revolution of the fly-wheel the stamper is lifted up, and with the other half it is forced down upon the metal.

When a fly-wheel is acted on by any prime mover, as wind, water, or steam, its motion continually accelerates, and a corresponding acceleration is induced in the wheel-work, in rollers, or in the stampers with which it is connected: the resistance to be overcome at what is called the working point destroys however this acceleration, and would allow the movement to be uniform, if it were not for the temporary accelerations or retardations which are caused by variations in the intensity of the moving power, or in the amount of the resistance; and these are almost wholly counteracted by the accumulated power which constantly exists in the fly.

If the effect of impact at the circumference of a revolving wheel be considered as proportional to the diameter, or radius, of the wheel and to its mass (supposed to be collected in its circumference), it may be represented by rW, r being the radius and W the weight of the wheel; the effect at a working point, when the latter is connected with the axis of revolution at a distance from it represented by r', being, to the effect at the circumference of the wheel, as r to r', we should have $\frac{r^2W}{r'}$ to represent the effect at such working point

Consequently, the place of the working point being given, it should follow that it is more advantageous to increase the diameter of the wheel, or its velocity, than its weight: but, in practice, there are certain limits both to the magnitude and the velocity of the wheel, which must not be exceeded, lest the centrifugal force arising from the revolution should destroy the cohesion of its parts.

ACERATHE'RIUM. Some fossil Rhinocerata have been thus named by Kaup.

ACERVULA'RIA, a genus of fossil Madrephylliæa.

ACHILLE'UM, a genus of fossil Spongiadæ, of which two species occur in the cretaceous strata of England. (Goldfuss.)

ACIDA'SPIS, a genus of fossil Crustacea, of the group of Trilobites; found in the Wenlock limestone. (Murchison.)

ACONI'TUM (*Monkshood* or *Wolfsbane*), *Medical Properties of.*—The botanical characters of this genus of Ranunculaceous plants have been already given. [P. C. vol. i. p. 88.]

Which species merits the preference as a medicinal agent, is a greatly controverted point. The London and Dublin Pharmacopœias, following the notions of Decandolle as to the identity of his A. paniculatum, var. γ Störkianum, with the A. Napellus officinalis, figured by Störk in his 'Libellus de Stramonio, Hyoscyamio, Aconito,' Vindobon. 1762, have given that as the officinal one, while the Edinburgh College has retained the common A. Napellus. The preponderance of evidence and good sense is in favour of the latter, as, besides the almost impossibility of procuring the plant indicated by the two former, since it is only a rare inmate of botanic gardens, it is substituting a confessedly less potent for a more potent plant. The Aconite of Störk, whatever species he used, was a plant possessed of great acrimony, while A. paniculatum has scarcely a perceptibly acrid taste. The officinal parts are the root and leaves, but the seeds might be added with propriety. Every part of the plant has a narcotico-acrid property. The live plant has little of the virose repulsive odour common in poisonous vegetables; nevertheless very sensitive individuals, by merely smelling the flowers, have fainted, and had dimness of vision for some days, and handling the fresh plant has occasioned tremblings and faintness. Honey collected from these flowers has caused severe suffering and even death. In making the essential extract, and in procuring the alcaloid *Aconitina*, the vapours have powerfully affected the operators; hence much care is required on their part. A small piece of the leaf, root, or a single seed, if chewed, causes a feeling of tingling, followed by numbness of the lips and tongue, which lasts for hours. A greater portion causes these sensations in the palate and throat, where in larger or poisonous doses a choking sensation is felt. The resemblance of many aconites, especially before flowering, to several umbelliferous plants in common use, such as celery, lovage, masterwort, &c., proves a frequent source of poisoning by them; a calamity further augmented by the inconsiderate practice of giving ignorant persons portions of the leaves to chew, or as a kind of parsley. (See a melancholy case of poisoning by Aconitum neomontanum, in Johnson's 'Medico-Chirurg. Review,' vol. lxi. p. 264.) Such unprincipled practices cannot be too severely reprobated. No complete analysis of the root or leaves of the A. Napellus has hitherto been published, though Pallas analyzed the root of A. Lycoctonum, and Bucholz the leaves of A. Medium, Schrad. It is probable that all the species contain similar constituents, differing only in degree, the most powerful being the A. ferox (Wallich, *Pl. Asiat. Rariores*, i. t. 41) or Bisk of Northern India. The most important are the alcaloid aconitina, aconitic acid, a fatty oil, and perhaps a volatile acrid principle. The latter probably results from the decomposition of aconitina by the action of heat. Almost all ranunculaceous plants have an acrid principle, which is very easily driven off by heat. Much care is therefore requisite in drying the root or leaves of aconite not to apply too high a temperature. The same precaution is required in forming the extract or inspissating the juice. A knowledge of this fact leads to the most convenient and effectual antidote in cases of poisoning by these plants, viz. causing the patient to drink very warm water till vomiting is excited. Linnæus saw aconite disarmed of its virulence, so that it could be used as a pot-herb, by merely boiling it, and adding a little fat or butter. (Linnæus, *Flora Lapponica*, p. 187, ed. Lond. 1792.)

The fatty oil is destructive of the sensibility of any part to which it is applied, but whether from inherent powers or from having aconitina dissolved in it is yet unknown. The alcaloid is regarded as the efficient principle when aconite is used medicinally. The forms of administration are various. Powder is objectionable from the variable degree of power. This further varies with the period when the leaves are collected. The best time to gather them is immediately before the flowers wither, as when the seeds advance to maturity the acrimony of the leaves rapidly diminishes. (Christison.) When the seeds are intended to be collected, this should be done just before they are perfectly ripe. The root should be taken up before the flowers expand; it must be carefully, yet speedily dried, at a very low temperature, otherwise it soon becomes mouldy and its activity is impaired, while a high temperature quite dissipates its valuable properties. The watery extract is a worthless preparation; and the inspissated juice of the London Pharmacopœia, improperly termed an extract, is also objectionable. The best forms are either an alcoholic extract of the leaves, or an alcoholic tincture of the root made by displacement. The inactivity of the watery extract and inspissated juice has led to statements in some popular treatises that it may be given in the dose of twenty grains, a quantity which would prove fatal when the extract is prepared with alcohol. Of this latter it is rare that two grains can be given with safety: a quarter of a grain is sufficient to begin with. Possessing narcotico-acrid properties, the action of aconite on the human frame is different according to the quantity used. In small medicinal doses its most obvious action is purely local; in larger, its action is both local and remote. Thus a small portion chewed produces an immediate action, tingling, followed by numbness of the lips and tongue; increased secretion of saliva also occurs. Minute doses taken into the stomach cause augmented secretion both of the mucous membrane and of the glands in the vicinity, the secretion of the liver is often markedly increased; while tingling of the extremities, with heat, is often felt, and either perspiration or increased action of the kidneys. The effect on the pupil is variously stated. Geiger affirms that aconitina produces dilatation of the pupil. Dr. Pereira most positively asserts, in his Materia Medica, that the external application of it produces contraction; while in his experiments with the extract of the Aconitum ferox (recorded in 'Edinb. Journ. of Natural and Geograph. Science,' July 1830, p. 235) he distinctly affirms that while the animal continued alive the pupils were 'much dilated,' contraction taking place only after the animal was apparently dead. Large doses cause redness and inflammation of the parts brought in contact with it; but the intellectual powers do not seem impaired by it, even when a fatal result occurs. Sir B. Brodie thinks that it occasions death by destroying the functions of the brain. ('Phil. Trans.' 1818, p. 186.) For this effect he does not consider absorption necessary; while Dr. Pereira concludes from his experiments, that the intensity of its remote action on the nervous system is in proportion to the absorbing powers of the part to which it is applied (*loc. cit.* p. 242). The susceptibility of the heart to galvanic agents is greatly impaired by it.

When first introduced into medical practice it was recommended in many diseases; but it is now almost entirely restricted to painful affections of the nerves, and to rheumatic complaints, particularly when they are complicated with syphilis. For nervous affections it is more used externally than internally, but this last mode is to be commended at the same time. An ointment is formed with one or two grains of the aconitina to one drachm of axunge. A small portion of this is to be applied frequently to the part affected. An eruption sometimes appears, especially if the ointment be strong. The internal use of aconitina is scarcely to be advised, one-fiftieth of a grain having endangered the life of an adult. The very high price of this article is an obstacle to its extensive employment; but ingenious chemists are endeavouring to simplify the process of extracting it. To obtain it perfectly pure it is almost essential to use sulphuric æther in the preparation of it, which necessarily increases the expense. The alcoholic tincture or extract is of great service in chronic rheumatism, and even in some cases of acute rheumatism.

Should poisoning occur, attempts must immediately be made to empty the stomach by emetics or the stomach-pump. No brandy or other form of alcohol should be given, nor vinegar, till all the herb is removed from the stomach, after which coffee with vinegar is very useful: venesection may sometimes be required.

ACORI'NÆ, ACORI'DEÆ, or ACORA'CEÆ, a small natural order of spadicose Endogens, with the following essential character:—The flowers are hermaphrodite, surrounded with scales. The spathe is leaf-like, but not rolled up. The stamens are complete, placed opposite the scales, and have 2-celled anthers which are turned inwards. The ovaries are distinct; the fruit is baccate, juicy at first, but finally juiceless. The seeds have the embryo seated in the axis of a copious albumen. The rootstock is jointed, the leaves sword-shaped and embracing each other in the bud. Such is the character given this order, which was first separated from Aroideæ by Agardh, and the separation was afterwards adopted by Schott, Link, and Lindley. The diagnostic characters of this order from Araceæ are—1, The different arrangement of the leaves in the bud, which are convolute in Araceæ, and hence a difference of habit is produced; and 2, the scaly rudiments of the perianth, which are never present in Araceæ. The genera assigned to this order by Lindley are Acorus, Gymnostachys, Tupistra, and Aspidistra. The two last genera however are assigned this position because the author did not know what else to do with them on account of their anomalous structure. This small group of plants in its geographical distribution is confined to the Eastern hemisphere. None of them have the acrid properties of some of the Araceæ. The Acorus calamus is a British plant, and has slightly aromatic properties. (Lindley, *Natural System.*) [ACORUS, P .C.]

ACQUI, *the Province of*, an administrative division of the Sardinian States, situated on the northern side of the Ligurian Apennines, the ramifications of which run northwards until they slope down into the great valley of the Po. The Bormida, the Belbo, the Erro, and other minor rivers, or rather torrents, which rise in the main ridge of the Apennines, flow between these offsets until they all join the Tanaro, which is the great affluent of the Po on this side. The province of Acqui was formerly called the High or Upper Monferrato, being part of the Marquisate of that name before it was annexed to the dominions of the House of Savoy. The country produces some corn and much fruit. The lower hills are planted with vineyards, from which good wine is made, known at Turin and Genoa by the name of Monferrato wine. The mountains are partly covered with chestnut-trees, which supply an article of common food for the peasantry. The rearing of silkworms is an important branch of industry. A considerable quantity of cattle, especially horned cattle, is bred in the province.

The province of Acqui is bounded on the north by Alessandria, east by Novi, south by Savona, and west by Alba. Its length is about 40 miles north to south, and its greatest breadth is about 25 miles. The population is 92,000 inhabitants, distributed among 73 communes. The head town of the province is called Acqui, and is a bishop's see. It is built partly at the foot and partly on the slope of a hill on the left or western bank of the river Bormida; it has a fine old cathedral with a handsome façade, several other churches and convents, a royal college, a clerical seminary, and a town-hall, some other remarkable buildings, and about 7800 inhabitants. The old walls of the town have been pulled down since the last peace of 1815. The old castle stands on a hill outside of the town, and is used as a prison. The town has some manufactories of linen and some tanyards. Acqui is much frequented by invalids from Lombardy and from Genoa for its hot sulphur springs; the establishment for bathing is about a quarter of a mile out of the town, on the opposite or right bank of the Bormida. The buildings have been restored and enlarged by the late king, Charles Felix. The 'fango,' or mud formed by the sediment of the water, is applied in many cases of local complaints or old wounds, and is considered very efficacious. The town derives its name from its springs, which were known to the Romans by the name of Aquæ Statiellæ, Statielli being the name of a tribe of Ligurians who inhabited this region, and who being joined by other tribes were defeated in a great battle near Caristum by the consul M. Popilius Lænas, 173 B.C. The consul razed Caristum to the ground, devastated the whole country, and sold many of the inhabitants. His severity was considered excessive even at Rome, especially as the Statielli had not born arms against the Romans until the other Ligurian tribes made a gathering in their territory, where they were attacked by the consul. The senate ordered the captives to be restored to liberty, and the purchase-money to be returned to the purchasers, gracing its resolution by the well-sounding moral, 'that the splendour of victory consists in subduing an enemy in arms, and not in oppressing those who have submitted.' The decree however was eluded for a time, and Popilius in the face of it again attacked the Statielli in the following year, and killed ten thousand of them. At last the senate and the people joined in reproving the conduct of Popilius, who was summoned to Rome to answer for his conduct, and his brother C. Popilius, the consul for the year, was commissioned to execute the former decree and liberate the surviving Statielli, several thousands of whom were released from slavery, and settled on some grounds which were assigned to them north of the Po. M. Popilius Lænas appeared before the prætor, C. Licinius, who being tampered with by the friends of the accused, put off the matter to the Ides of March, when the new magistrates came into office, and Licinius retired into private life, by which means Popilius came off unpunished. 'Thus,' tamely observes Livy (42, c. 22), 'by an artful trick the rogation concerning the Ligurians was eluded.' Afterwards the mineral springs above mentioned having attracted the attention of the Romans, the place became known by the name of Aquæ Statiellæ, and there are inscriptions remaining which relate to the care taken of the thermæ, or warm baths, by the local officers.

In the early part of the middle ages Acqui was a countship, one of the early counts of which was a certain Aleramus,
whose history has been interspersed with wonderful fabl
by the chroniclers: he fought valiantly against the Moors
Saracens who had invaded part of Liguria. He married
daughter of Berengarius II., some say of Otho I., w
made a marquis, and died A.D. 993. He was the progenit
of the Marquises of Monferrato and of the Marquises
Saluzzo, who figured for centuries afterwards in the vicis
tudes of North Italy.

The other towns of the province of Acqui are—1. Niz
della Paglia, called also Nizza di Monferrato, situated in
pleasant district on the banks of the Belbo, with about 35
inhabitants. It is the native place of the Jesuit Giulio Ces
Cordara, a distinguished writer both in Italian and Latin, wl
flourished in the eighteenth century. 2. Ovada, a town of 60
inhabitants, situated among the Ligurian Apennines. 3. Stre
a small town, known for its good wine. A number of small
towns and villages, of from 1000 to 2000 inhabitants, are sca
tered throughout the province.

(Casalis, *Dizionario Geografico, Statistico, Commercial*
degli Stati di S. M. il Ré di Sardegna; Denina, *Quadro de*
Alta Italia; *Calendario Sardo.*)

ACRE, SAINT JEAN D', the celebrated fortress
the coast of Syria, was taken by the united English and A
strian squadrons in 1840, after a bombardment which w
short, but so effective as to form one of the most memorab
events in modern warfare. Great Britain and her allies, A
stria, Prussia, Russia, and Turkey, having concluded a trea
at London on the 15th of July, 1840, for the purpose of dri
ing the Egyptian troops out of Syria, and restoring this cou
try to its former master, the Sultan, a combined English a
Austrian fleet attacked and took the Syrian seaports. On t
2nd of November, 1840, this fleet arrived off Acre: it co
sisted of seven English line-of-battle ships, four war-steame
for throwing shells, and some smaller vessels, commanded
Admiral Sir Robert Stopford, who was commander-in-chi
of the united fleet, and under whom Sir Charles Napier act
as commodore of the English squadron; and two Austrian fr
gates, the Medea, on board of which the Austrian admira
the Marquis de Bandeira, had hoisted his flag, and the Gue
riera, commanded by Captain the Archduke Frederick
Austria. The attack began on the following day, the 3rd
November. The ships had some difficulty in taking the
positions, as the officers had no good chart of the coast n
plan of the fortress, which, through the care of the pasha
Egypt, Mehemet Ali, had been made almost impregnabl
except to troops and officers who combined the most consu
mate skill with the utmost bravery. After a heavy firing
two hours, which was well answered by the Egyptians, t
grand magazine blew up with a tremendous explosion, pr
bably ignited by a shell from one of the steamers. Tw
entire regiments of infantry, which were standing in batt
array near it, were annihilated, as well as every living creatu
within an area of 60,000 square feet. The Egyptian co
mandant nevertheless continued to defend the town, but the fi
of the ships was so effective that it was discontinued at su
set, and the admiral prepared for a storm on the following da
This however the commandant did not await, but evacuat
the fortress during the night of the 3rd of Novemb
with the feeble remnant of his garrison, the force of whi
was from 4500 to 5000 men before the action. On the 4
the Anglo-Austrian force took possession of Acre: they lo
some men by a second explosion, the blowing up of a mag
zine of loaded shells which had been covered by the rubbish
the grand magazine, under which fire was smouldering. T
allies lost eighteen killed and forty-one wounded. Lieutena
G. B. Le Mesurier, of the Talbot, was the only officer kille
After the fall of this bulwark of Syria, Ibrahim Pasha evac
ated that country and retired to Egypt. Acre has since be
restored to the Turks, and some care has been taken by the
in rebuilding the fortifications, but the whole is still little mo
than an indefensible heap of ruins. (Sir Charles Napier, *T*
War in Syria.)

ACROCU'LIA, a fossil genus of Gasteropoda, allied
the Neritadæ. It occurs in Palæozoic strata. (Phillips.)

A'CRODUS, a genus of fossil Placoid fishes, establishe
by M. Agassiz. The species occur almost exclusively in th
lias and oolite. One British species (A. minimus) is referre
to the keüper series by M. Agassiz. It occurs at Aust Cli
in the bone-bed. The others abound at Lyme Regis, Bath
and Stonesfield.

ACRO'GASTER, a fossil genus of fishes. (Agassiz.)

ACRO'GNATHUS, a genus of fossil Cycloid fishes, foun
in the chalk of Sussex. (Agussiz.)

ACRO'LEPIS, a genus of fossil Ganoid fishes, found in the magnesian limestone of Durham. (Agassiz.)

ACROSALE'NIA, a genus of fossil Echinodermata. (Agassiz.) It occurs in the Isle of Sheppy. (Bowerbank.)

ACROTE'MNUS, a genus of fossil Ganoid fishes. A. faba is found in the chalk of Sussex. (Agassiz.)

ACTA SANCTO'RUM. [BOLLANDUS, P. C.]

ACTI'NOCAMAX, a division of Belemnites, proposed by the late Mr. Miller of Bristol, upon the supposition that the species which he ranked in it had no true alveolar cavity or phragmacone. The correctness of this view is doubtful. The species belong to the cretaceous strata. [BELEMNITE, P. C.]

ACTINO'CERAS, a genus of fossil Cephalopoda, separated from Orthoceras by Mr. Stokes. The species belong to Palæozoic strata. A. Simmsii occurs in Ireland.

ACTINOCRINI'TES, a genus of Cinoidea [ENCRINITES, P. C.], containing many species. It occurs in Silurian and carboniferous strata. (Miller.)

ACTINO'METER (from *ἀκτίν*, a sunbeam; and *μέτρον*, a measure) is an instrument employed for the purpose of ascertaining the intensity of heat in the direct rays of the sun. It is a highly delicate thermometer, having a large cylindrical bulb filled with ammonio-sulphate of copper (a deep blue fluid), and a capillary tube, to which a graduated scale is applied. It was invented by Sir John Herschel, who gave a description of it in the 'Edinburgh Journal of Science' for 1825 (vol. iii.). The construction of the instrument and the manner of using it are noticed under the word THERMOMETER, P. C., p. 350.

The indications of heat afforded by the actinometer depend evidently upon the magnitude of the beam of light which falls on the bulb and upon the bore of the tube, within which the fluid rises from the effect of the heat. The area of a longitudinal section through the axis of the cylindrical bulb, which is also the area of a transverse section of the beam of light incident on the bulb, is taken for the former; such sections, in different instruments, being proportional to the hemi-cylindrical surfaces which receive the beams; and the volume in the interior of the capillary tube, of one of the spaces corresponding to the length of a degree on its scale, measures the expansion of the fluid produced by a portion of the heat. This volume is found by measuring the volume of mercury which would fill a given length of the tube, and it should be determined by the maker of the instrument before its parts are put together.

The length of a degree on the thermometric scale is at present arbitrary, and the relative values of the degrees on the scales of different instruments are determined by comparing together the indications made in like circumstances. For this purpose, different persons may make observations simultaneously with the instruments, or the same person may make several observations with two instruments, exposing them alternately to the sun's rays. Such comparisons must necessarily be made when it is required to determine the corrections which should be applied to the indications of different instruments, on account of the unequal absorption of light in the plates of glass which cover them: the observations for this correction are made by exposing the instrument with the glass alternately on and off.

Sir John Herschel proposed to establish, as a unit for the intensity of solar heat, that value which would, in one minute of mean solar time, dissolve a thickness equal to one-millionth part of a metre (0·00039 English inch) of a horizontal sheet of ice when the sun's light falls vertically upon it. This he calls an *actine*; and, from experiments made by him at the Cape of Good Hope, he determined the value of a degree, on the scale of one of his actinometers (H, No. 8), to be equivalent to 6·093 actines. ('Phil. Trans.' 1842, part ii. p. 272.) Apparently however it has been hitherto preferred to determine the intensities of solar heat by comparisons of the indications given by different instruments.

It has been stated [THERMOMETER, P.C.] that the observations with an actinometer should be made at intervals of time equal to one minute: when the intervals are not one minute, the observations may be reduced to such by simple proportions, provided the deviations from one minute do not exceed a few seconds. On observations at half-minute intervals being made, Professor Forbes ('Phil. Trans.' 1842, p. 246) employed the factor 2·224, in order to obtain the equivalents for intervals of one minute.

The actinometer is highly useful in determining the quantity of solar heat which is absorbed in passing through different strata of the atmosphere, for which purpose the observations must be made at stations differently elevated above the general surface of the earth or sea. It may also be employed to determine the diminution of heat which takes place during eclipses of the sun.

ACTION (at Law). [See P. C. vol. i. p. 105, for ACTION, definition of; general object of; general principle respecting: three kinds of; general outline of proceedings in.]

On this head the following remarks may be added:—

1. When the object sought to be obtained by an action is a pecuniary compensation in damages, as in a case of an assault, breach of contract, &c., the party injured has an incomplete or inchoate right to such compensation as soon as he receives the injury, though such right be not fully ascertained till the amount of the damages are assessed through the intervention of law, that is, by the verdict of the jury by whom the action is tried. 2. Personal actions are founded either on contracts or torts, a term used to signify such wrongs as are in their nature distinguishable from breaches of contract, and these torts are usually considered as of three kinds, viz. nonfeazance, or the omission of some act which a man is bound to do; misfeazance, or the improper performance of some act which he may lawfully do: malfeazance, or the commission of some act which is unlawful. Actions founded on contract are sometimes described as actions ex contractu, and those on tort as actions ex delicto, a division which, as well as the terms used to express it, is derived from the Roman law (obligationes ex contractu, obligationes ex delicto: Gaius, iii. 182). 3. Actions are either local or transitory: local actions are founded on such causes of action as necessarily refer to some particular locality, as in the case of trespasses to land: transitory actions, on such causes of action as may be supposed to take place anywhere, as in the case of trespasses to goods, batteries, and the like. Real actions are always in their nature local, personal actions are for the most part transitory. Between local and transitory actions there is this distinction, that local actions must be tried in the proper county where the cause of action arose, and by a jury of that county: transitory actions may be tried in any county, at the discretion (in general) of the plaintiff. It follows from this that when an injury is committed out of England, and its nature is such as to make the action local, no action at all will lie for its redress in any English court. On the other hand, where the nature of the injury is such that the action is transitory, such action will lie in the English courts, whether the injury was committed in England or elsewhere. When the cause of action arose abroad, in a transitory action it was formerly necessary to have recourse to a legal fiction, and to allege that it arose in an English county. This fiction is now abolished, though the plaintiff in his declaration is still required to specify in the margin some English county as that in which he proposes that the cause should be tried. By the stat. 3 & 4 Wm. IV. c. 27, s. 36, all real and mixed actions are abolished, except 4, Writ of right of Dower, Dower, Quare Impedit, Ejectment. 4. Though an action will lie for a wrong unattended with actual loss or damage (as for instance where one commoner sues another for surcharging a common, that is, turning on more cattle than he was entitled to do, although the plaintiff may not himself have turned on any cattle of his own during the same year, and cannot therefore have sustained any actual loss), yet none can be maintained even for loss or damage actually inflicted, unless it result from a wrong, it being a maxim that a mere loss without a wrong is not actionable. Thus if I have a mill, and my neighbour builds another mill upon his own ground, by which the profit of my mill is diminished, yet no action lies against him, for every one may lawfully erect a mill on his own ground; but if I have a mill by prescription on my own land, and another erects a new mill which draws away some portion of the stream from mine, so as to diminish its former power, an action will lie against him of trespass on the case. 5. A plaintiff is not entitled to recover in respect of any damage that is too remote, or in other words, flows not naturally and directly from the alleged wrong. Thus, where the plaintiff, being a director of certain musical performances, brought an action on the case against the defendant for publishing a libel on a public singer engaged by the plaintiff, alleging that she was thereby deterred from performing in public, through the apprehension of being ill received, so that the plaintiff lost the profits which would otherwise have accrued to him as such director, it was held that the damage was too remote, and the action not maintainable. 6. As to suits of every class, it is generally true that the right of action is not assignable, so as to enable the assignee to sue at law in his own name; but in certain cases it is transferred by

operation of law. Thus the rights of action of a bankrupt or insolvent pass (with certain exceptions) to their assignees; and upon the death of either of the parties between whom a cause of action has arisen, the right of maintaining such action survives in general to or against his executors or administrators. But in respect to suits which are founded on the violation of personal rights, as in the case of an action for slander, the maxim is that they die with the person, and by the common law this extended to every case of tort; but it is now no longer the rule as regards torts committed in respect of property. (4 Edward III. c. 7; and 3 & 4 William IV. c. 42, s. 2.) 7. The regular parts of an action at law are:—1, the process, or those proceedings which have for their object the compelling the defendant to appear, that is, to admit that he has a general intimation of the suit, and is ready to receive more particular notice of its ground and object; 2, the pleadings; 3, the trial and evidence; 4, the judgment; 5, the writ of error (where the judgment is supposed to be erroneous); 6, the execution. 8. By the stat. 2 Will. IV. c. 39, and the rules of court founded upon it, and by statutes 3 & 4 Will. IV. c. 67, and 1 & 2 Vict. c. 110, it is now provided that all personal actions shall be commenced by writ of summons, which is a writ issued out of the court in which the action is brought, directed to the intended defendant himself, and which, without setting forth the particular cause of action, but merely describing the action as one of debt, trespass, or the like, commands him to cause an appearance to be entered therein within eight days after the writ shall have been served upon him. Previously to the passing of the last-mentioned statute a plaintiff might commence an action of debt by arresting the defendant where the alleged subject of dispute was a debt to the amount of 20*l.* at the least. Arrest on mesne process, that is, this first stage of the action, is now abolished. [Arrest, P. C. S.]

(For further particulars see references in P. C. vol. i. Action; and Blackstone, *Comm.*; Stephen, *Comm.*; Stephen, *On Pleading*; Chitty, *On Pleading*.)

ACTION UPON THE CASE. [Case, Action upon, P. C.]

ACTION AND REACTION. [Motion, Laws of, P. C.]

ACTION, LEAST, PRINCIPLE OF, is a name given by Lagrange to a law of motion which he has thus enunciated:—In a system of moving bodies, the sum of the products of the masses of the bodies by the integral of the products of the velocities and the elements of the spaces passed over, is constantly a maximum or a minimum.

The principle, in a limited sense, originated with Maupertuis, who, in the 'Mémoires de l'Académie des Sciences de Paris,' for 1740, designating it the 'Law of Rest,' states that when bodies in motion act upon one another, the sum of the products of the masses by the velocities, and by the spaces described, is a minimum; and from this principle he deduced the laws of the reflexion and refraction of light, and of the collision of bodies. Euler also, in his 'Traité des Isopérimètres' (Lausanne, 1744), showed that when isolated bodies describe curvilineal paths by means of central forces, the integral of the product arising from the multiplication of the element of the curve by the velocity is always a maximum or a minimum. But the generality of the principle was established by Lagrange, who has extended it to the motion of a system of bodies acting upon one another in any manner whatever; and his first applications of it to the solution of dynamical propositions are contained in the second volume of the 'Mémoires de l'Académie, &c. de Turin.'

The analytical expression of the principle is, that $\Sigma m\int v ds$, or $\int \Sigma m v ds$, is a maximum or a minimum, or that the infinitely small variation of that quantity is zero. (Here m is the mass of a body, v its velocity, and ds the element of the space passed over.) But $ds = v dt$ (dt being the element of time); therefore, $\int \Sigma m v ds$ is equivalent to $\int \Sigma m v^2 dt$. Now, $\Sigma m v^2$ is the expression for the active or living force of a finite number of bodies or molecules [Vis Viva, P. C.]; and it follows that the principle of 'least action' is the equivalent of the expression that the integral of the product of the living force of a system by the element of time, is in general a minimum.

The truth of the 'Principle of least action' may be readily proved from the general dynamical equation [Virtual Velocities, P. C., p. 380, col. 1], the sum of the terms containing X, Y, and Z, being made equivalent to $\delta\frac{1}{2}\Sigma m v^2$, or to $\Sigma m v \delta v$, conformably to what is shown in the article just quoted; and the whole being transformed agreeably to the process used in the 'Mécanique Analytique' (sect. iii. No. 39). It will be needless however to give the details, since, as is observed by Poisson, the use of the principle is only to serve as a rule for forming the differential equations of motion, and these may be obtained at once from the 'General Equation' to which reference has been made above.

ACTIVE OR LIVING FORCES. [Vis Viva, P. C.]

ACTON BURNEL, STATUTE OF. This statute was passed at Acton Burnel, in Shropshire, at a parliament held by Edward I. in the eleventh year of his reign, on his return from Wales. Acton Burnel was never even a market-town, and Leland says (*Itin.* vii. 19) that the parliament was held in a great barn. The date of the statute is October 12, 1283. It is remarkable as a proof of the importance which the mercantile class had acquired, and its object was to recover more quickly debts due to merchants and traders. Hence it is called the Statute of Merchants (Statutum Mercatorum).

The preamble recites, that, 'Forasmuch as merchants which heretofore have lent their goods to divers persons be greatly impoverished because there is no speedy law provided for them to have recovery of their debts at the day of payment assigned; and by reason hereof many merchants have withdrawn to come into this realm with their merchandises, to the damage as well of the merchants as of the whole realm;' and therefore 'the king by himself and his council ordain and establish' certain remedies for the evils complained of. (*Stat. of Realm*, i. 53.)

The merchant was to bring his debtor before the mayor of London, York, or Bristol, or before the mayor and a clerk who was appointed by the king, acknowledge the debt, and fix a time for payment. The clerk entered the recognizance, and also made a writing obligatory, to which the debtor affixed his seal. The king's seal, provided for the purpose, and kept by the mayor, was likewise appended to the instrument. If the debtor neglected to pay his debt at the time appointed, the mayor ordered his chattels and devisable burgages to be sold, to the amount of the debt, by the appraisement of honest men. The moveables were to be delivered to the creditor if no buyer came forward. In case the debtor's moveables were out of the mayor's jurisdiction, the chancellor was to direct a writ to the sheriff of the county, who was to act with the same authority as the mayor. The statute contains several provisions relating to the sale. To guard against the appraisers favouring the debtor by fixing too high a price on his goods, they might themselves be forced to take them at their own unfair valuation; and in that case they became answerable to the creditor for the debt. The statute inferred, on the other hand, that if the goods sold below their value, it was the debtor's fault. If the debtor had no effects, he was to be imprisoned until he or his friends had come to some agreement with the creditor; and the creditor was bound to provide him with bread and water, if he were so poor as to be unable to support himself: but the cost of his maintenance added to the original debt, and was required to be repaid before the debtor could obtain his release. The creditor might accept sureties or mainpernors, who by this act placed themselves precisely in the same situation as the debtor; but they were not liable till the goods of the principal had been sold and found insufficient.

The statute of Acton Burnel was further explained and new provisions added by 13 Edw. I. stat. 3, passed in 1285. The first statute appears to have been misinterpreted by the sheriffs, and its execution delayed on malicious and false pretences. The king therefore, in a parliament held in his thirteenth year, caused the statute of Acton Burnel to be rehearsed, and another Statutum Mercatorum (13 Edw. I. stat. 3) was passed, which extended and gave additional facilities for enforcing the statute of Acton Burnel. Recognizances might be taken before the mayor of London, or before some chief warden of a city or of another good town which the king should appoint, or before the mayor and chief warden or other sufficient men chosen or sworn thereto, when the mayor or chief warden could not attend, and before one of the clerks appointed by the king. If the debtor failed to make good his payment at the time promised in his recognizance, he was, if a layman, to be placed at once in prison. If he could not be found, the merchant might have writs to all the sheriffs in whose jurisdiction the debtor had lands; and as a last resource the merchant might have a writ directed to any sheriff that he pleased to take the debtor's body. The keeper of the prison became answerable for the debt if he refused to take custody of the debtor. Within a quarter of a year the chattels and lands were to be delivered to the creditor for sale in payment of his debt. If within the second quarter he did not make terms, all his goods and lands were to be delivered, the latter as if a gift of freehold, to the creditor, to hold until the debt was paid; the debtor being maintained on bread and water by the merchant. Precautions were taken against the debtor fraudulently making over his property. Lands given away by feoffment subsequently to the recognizance were to return to the feoffor. The death of the debtor did not bar the debt; for though the body of the heir could not be taken, his lands were answerable as much as during the lifetime of the debtor. The Jews were excluded from the benefits of the statute. (*Stat. of Realm.* i. 98.)

Reeves (*Hist. of the English Law*, ii. 162) observes that the above statute may be 'considered as contributing to extend the power of alienating land.' Any common creditor by judgment was empowered in the same session to take half the debtor's land in execution, 'but a merchant who had resorted to this security might have the whole.' He adds that 'a recognizance acknowledged with the formalities [here] described was in after times called a statute merchant;' and 'a person who held lands in execution for payment of his debt, as hereby directed, was called tenant by statute merchant.' Barrington (*Obs. on the more Ancient Statutes*, p. 119) states that in 1536 an ordinance of Francis I. was issued, which very much resembled the statutes merchant, and shows, he says, 'the more early attention paid to commerce in this country.'

ADA'L is the Arabic name of a part of the eastern coast of Africa, and has been adopted by European geographers. Until lately it was applied to the country that surrounds the Bay of Tajurrah, which constitutes the most western corner of the Gulf of Aden, and to that tract of coast which extends from the Bay of Tajurrah to the Strait of Bab-el-mandeb, but of late years it has been ascertained that it is applied to all the countries inhabited by a nation called by the Arabs Danákil: they call themselves Affar. The name Adal, or rather Adaiel, is derived from Ad Alli, which is the name of one of the most famous tribes of the Danákil.

The Danákil tribes inhabit the coast from the Bay of Tajurrah to Cape Bab-el-mandeb, and from Bab-el-mandeb along the shores of the Red Sea to the harbour and town of Massowah, from 11° 30′ to 15° 40′ N. lat. It is not yet known how far inland the countries extend which are occupied by this nation, except at the most northern and the most southern extremity. Opposite Annesley Bay, south of Massowah, the Danákil occupy only the narrow flat which lies along the Red Sea and the acclivity by which the table-land of Abyssinia is ascended: both taken together do not exceed 40 miles in width. At the back of the Bay of Tajurrah their territories extend to some distance west of the river Hawash, or at least 120 miles from the sea. As the highlands of Abyssinia gradually approach nearer to the shores of the Red Sea as they run farther north, the territories possessed by the Danákil grow narrower in that direction.

Coast and Islands.—The length of the coast along the Red Sea is above 300 miles. In several places it is studded with rocky islands. With some few exceptions they belong to the coral formation. Their surface consists of small fragments of coralline rocks mixed with sand, shells, and the indurated parts of mollusca. These islands do not in general rise more than 12 feet above the sea. In the dry season they appear to be quite bare of vegetation, but in the wet season, which lasts from December to April, the shrubs are covered with leaves, and a scanty grass springs up in some tracts: a few mimosas preserve the moisture longer. No agriculture is carried on. Only a few of these islands are inhabited the whole year by some families who live by their fisheries: many of them are used as pasture for goats, and some antelopes are met with. The largest of these islands is Dhalak. Between these islands and the mainland are several anchorages, but few of them are good: it is however remarkable that the wind never blows a gale along this coast, however boisterous the weather may be in the middle of the sea or along the coast of Arabia; thus the harbours generally afford shelter, especially to small vessels.

The adjacent coast resembles the islands in its formation. It consists of coral rocks rising abruptly 10 or 12 feet above the sea, but on the top it extends in a dead level. Opposite Massowah Bay this level is about two miles wide, but farther south somewhat wider. It is furrowed by numerous watercourses, in which during the rains an immense volume of water rushes down from the adjacent mountains; but when the rains have ceased the beds become dry, and in that state they remain for eight months. There are no springs, and the rain-water is preserved in tanks; but water may also be obtained by digging in the dry beds of the watercourses, where it is generally met with at a depth of 12 feet. The soil consists of sand, mixed with coral rocks and the shells of shell-fish, and is so sterile that the whole is left in its natural state, cultivation being limited to a few gardens in which hennéh (Lusonia inermis) is grown. Full-grown trees are only found in the beds of the rivers: in other parts there are only a few isolated mimosas and acacias, a coarse kind of grass, saline plants, and asclepias. Along the sea are isolated bushes of avicennia (Avicennia alba, Blum.) and tamarisks. Between the Bay of Massowah and Annesley Bay is Mount Gedem, which has a tolerably regular form, and rises about 5000 feet above the sea. It is isolated, and its upper part is covered with large trees, but there are no springs at its base.

South of this mountain the level plain grows wider, being three miles across. There are dispersed over it a considerable number of conical hills, which rise from 200 to 300 feet above their base. In their vicinity the soil chiefly consists of decomposed lava, and is much more fertile than the other parts of the plain: trees however are wanting, and low bushes appear only occasionally. In winter this tract is covered with excellent grass, and makes fine pasture. Camels, goats, and sheep are comparatively numerous. Cattle are not so common. Antelopes are numerous. Water is generally got by digging a few feet below the surface.

It is a general opinion that the low tracts along both sides of the Red Sea are the hottest countries on the globe. This is also confirmed by the meteorological observations which were made by Rüppel at Massowah during eight months (from Sept. 1831, to April, 1832). During the wet season (from December to April) the temperature ranged between 72·5° and 80° before sunrise, and between 82° and 88·5° at three o'clock in the afternoon. In the hot and dry season (from July to September) the temperature before sunrise ranged between 86° and 92°, and in the afternoon it was generally five degrees higher. In this season the sky is rarely overcast; but in the beginning of October, when the rainy season on the table-land of Abyssinia is near its termination, thunder-storms are frequent. This region has regular land and sea breezes, but the land-breezes are slight. The mean annual temperature of Massowah is 88°.

Though this low tract produces hardly anything fit for use except fire-wood, the sea supplies subsistence and articles of commerce to many families. Pearls are found in some places, especially in the vicinity of Dhalak, and also turtle. Among the fishes are whales, probably the Physeter; three kinds of dolphins, of which the largest is a Phocaena; and the dugong, of which last three hundred are annually taken by the fishermen of Dhalak.

Physical Geography.– The interior of Adal is only known along the routes which European travellers have followed in ascending from the sea to the table-lands of Tigré and Shoa. Those who have visited Tigré traversed the country south of the harbour of Massowah, and those who visited Shoa departed from Tajurrah, and reached Ankóbar by a south-western road.

The acclivity by which the table-land of Tigré is ascended occupies a space varying between 30 and 40 miles in width. Its direction is nearly parallel to the sea-coast. The depressions, valleys, or ravines by which it is furrowed generally traverse it at right angles to the edge of the mountain-mass, but at others they cut that edge obliquely, running from north to south. Near the low tract along the coast the rise is gradual, and the country at a distance of from 25 to 35 miles attains only an elevation of about 2000 feet above the sea-level; but as it approaches the edge of the table-land the ascent is very steep, for within six or eight miles the rise of the rocky mass generally amounts to between 6000 and 7000 feet.

At the back of the low tract along the sea the rise of the country is very gentle, presenting an inclined plain cut by depressions, in which the watercourses lie. The surface of this tract is sandy, and nearly without grass, but sprinkled with acacias and low bushes: it occupies about three miles in width, and is not inhabited. Adjacent to it is a much better tract: its surface consists of low hills composed of black rock, and supplies tolerably good pasture in the rainy season. The depressions between them may be called valleys. In winter they are traversed by large torrents, and in summer there is always excellent water a few feet below the surface in the beds of the streams. These valleys are covered with bushes and a few trees, of which the acacia is most common. There are many small villages, which are inhabited by herdsmen. In approaching the base of the steeper declivity the rocky masses that enclose the valleys become much more elevated, but at the same time the valleys themselves are wider. The more elevated part of this tract is an inclined plain with a strongly undulating surface. In general the eminences are composed of volcanic matter: in some places lava is found, and at others the surface is covered with a salt efflorescence. The valleys are full of bushes, and in many parts there are groves of trees, and the upper country is covered with low and stunted thorn-trees. In the valleys there are sycamores of considerable size and nabac bushes (Rhamnus nabca), which produce an edible and pleasant fruit. Near the base of the steep ascent some of the valleys are contracted to ravines, but others widen into plains: such is the Valley of Modat, about 25 miles due west of Massowah, which is nearly three miles wide, and extends to a considerable distance from south-east to north-west along the base of the mountain-masses. In this valley, as in other parts of this region, a few spots are cultivated with durra (Holcus sorghum). Cattle are kept; and large quantities of butter are made and sent to Massowah, and thence to Arabia. At the end of the dry season (from June to November), when the grass in the valleys is dried up, the cattle ascend the higher acclivity of the mountains, and even to the table-land of Tigré. Camels, mules, asses, goats, and sheep are abundant. This tract is the haunt of numerous wild animals: elephants are sometimes met with, which have descended from the table-land. Lions also sometimes make their appearance. There are numerous wolves, hyænas, lynxes, leopards, foxes, wild hogs, several kinds of antelopes, among which are the Antilope strepsiceros and the gazelle, and hares. Among the birds are several kinds of parrots (Fringilla paradisea) and pearl-fowls (Numidia ptilonorhyncha.)

The upper declivity of these rocky masses presents a succession of long and steep ascents and sloping terraces of moderate extent. The ravines by which they are intersected contain large trees. On some of the terraces a little cultivation is carried on, and durra and barley are grown. In this region the Euphorbia Canariensis is found, and this plant increases in abundance and size with the elevation of the mountains. Camels, cattle, and goats find abundant pasture. This region is inhabited by nomadic tribes.

This description applies to the caravan-road from Massowah to the village of Halaï, situated on the top of the ascent on the table-land of Tigré, and this road has been followed until lately by all travellers to Abyssinia. It is called the road by the Pass of Taranta, which name is applied to the higher and steeper portion of the acclivity. The village of Halaï is 8628 feet above the sea-level; and a resting-place at the base of the steeper ascent, called Mahio, is only about 2130 feet; but of late years it has been ascertained that there are in the vicinity of this pass two other passes, which are preferable, because the ascent is less steep. One lies north of the Taranta Pass, and connects the village of Gara on the table-land with Massowah; and the other is south of the Taranta Pass, and leads from the village of Tekunda (Degonta) down the declivity to Arkiko and Massowah.

We pass to the southern extremity of Adal, to the caravan road which leads from Tajurrah to Ankóbar, the capital of Shoa. The country through which this road runs is a table-land of moderate elevation, and it may be considered as an intermediate terrace by which the highlands of Shoa are ascended. The surface exhibits a considerable variety. No portion of it is under cultivation; but, with the exception of a few tracts of no great extent, it supplies pasture all the year round: at the end of the dry season however, in May and June, it suffers from want of water.

A short distance from the shore on which the town of Tajurrah is built, there is a cluster of hills of trachyte formation, the highest point of which, called Mount Gudah, is 2000 feet above the sea. This group of hills is traversed by glens, through which a considerable volume of water runs during the rains, but very little is found at the end of the dry season. Between these hills and the sea-shore is a narrow tract formed by sandy deposits covering a stony substratum. Water is obtained from wells: it is pure, but has an unpleasant taste. Grass is scarce, and only goats are kept. There are only shrubs and dwarfish mimosas, with a few date-trees, near the villages. Of wild animals, antelopes, hares, jackals, lynxes, and leopards are numerous, and various kinds of birds.

The Bay of Tajurrah terminates in a shallow lagoon called Gubbat-el-Kharab. This lagoon approaches the bas table-land covered with lava, which extends westward vicinity of Lake Assal. The road lies north of this land. It passes through low undulating hills covere basaltic boulders and a hilly table-land to the Plain of lissan, which is covered with pebbles, and has neithe nor water. This plain is 1697 feet above the sea-level descent from this plain to the Bahr Assal (Salt Lak through an exceedingly broken country between hi steep hills. The whole of this tract between the Bay jurrah and Bahr Assal is a waste, without water or veg The Bahr Assal is 570 feet below the level of the sea of an oval form, about seven miles across in its long meter, which runs from south-west to north-east, an three miles wide. About one-third of its surface is with a sheet of salt, about half a foot thick, which re ice. The lake is shut in on the northern, western, and so shores by ranges of high hills, among which is Mount on the northern side, which is probably 1500 feet abo sea. On the eastern side is a bed of lava, which, as h mentioned, extends to the Gubbat-el-Kharab, and which tains several deep craters. It is supposed that at this the lake was, at some remote period, connected with the of Tajurrah.

On the south-west of Bahr Assal is a hilly tract. The near the lake are precipitous and high, but farther on they low and rounded. The country rises slowly, for the Plai Gagade, more than 20 miles distant from the lake, is only feet above the sea. The water in this tract is plentiful, has a brackish taste. Grass is only found at a few spots at end of the dry season. A few groves of doom palm-trees met with. The Plain of Gagade is eight miles in bread and lies between high hills running from south-east to no west. The surface is partly composed of a hardened cracked alluvial deposit, which is quite bare, and is pa covered with a thin soil overgrown with a jungle of ac and a species of spartum.

After leaving this plain the country rises more rapidly. few miles farther to the south-east it is 1200 feet above sea-level. Farther on the country preserves in general same level. The surface is a plain, occasionally diversified elevated ridges, some of which are composed of lava, sometimes by depressions in the form of valleys. Some p of the plain have a stony soil, and are covered with bas fragments and lava. Scarcely a trace of vegetation is fo on them. Other parts have a sandy and sometimes a st soil; but they are covered with coarse grass even in the season. Some tracts bear a rich grass, and resemble the pl of the Deccan. Water is generally got by digging in the b of dry rivers and by wells. These plains terminate on the w at the Mari range, which rises about 1000 feet above the jacent country, and runs for several miles across the pla from south-east to north-west. It is basaltic, and the base strewn with huge blocks, which have been detached from face. Its width does not appear to be much more than a mil

The plains continue nearly on the same general level west o the Mari range. In fertility they resemble those east of the ridge, except that the grass is generally more abundant. The Plain of Killelu, which is from 20 to 30 miles wide, is always covered with grass. It terminates at the Wady Killelu, a large ravine bounded by basaltic cliffs from 800 to 900 feet high. At the end of the dry season water is only found in pools, but during the rains it is a large river, which receives the drainage of an extensive tract, and carries it to the Hawash river. The ravine is covered with bushes which are not found in other parts of the table-land, where the soil is very dry.

West of the Wady Killelu the table-land rises gradually till it attains an elevation of 2000 feet above the sea. The soil is here more volcanic, and improves in fertility; but the surface is more broken, and level plains are rarer and of less extent. Extensive tracts rest on basaltic rocks, and are only covered with a thin layer of soil, which however is covered with a thick turf. But this region is almost destitute of water. On the west of this tract two lofty peaks rise from the plain, Mount Abida and Mount Aiyalu or Azolo. Mount Abida rises about 4000 feet above its base and Azolo still higher. They appear to stand in the centre of a volcanic tract, from which sheets of lava have descended on all sides to the plain, forming a field of volcanic matter about 30 miles in diameter, studded with small cones, each showing a distinct crater. Mr. Kirk counted 21 of such cones. The surface of the lava appeared fresh and glossy. The vast plain adjacent to this the tube, along which, then, the particles flow in directions nearly parallel to its axis, with nearly equal velocities, those near the surface being carried on with those about the axis, in consequence of the lateral communication which takes place in fluid currents. Atmospheric pressure seems, however, necessary to the production of such effects, since, from the experiments of Venturi and Dr. Matthew Young, the accumulation and increase of discharge in tubes do not take place in a vacuum.

The increased discharges in cylindrical and conical tubes have been stated in HYDRODYNAMICS, P. C.; but it may be noticed that they cease when the water separates itself from the surface of the tube, so that the latter is no longer filled with the fluid; and such separation may be produced by the concussion arising from a slight blow given to the tube. M. Eytelwein found, that if a cylindrical tube be allowed to project within a reservoir, it reduces the discharge through a simple orifice by one-half, probably in consequence of its interference with the tendency of the particles to converge towards the latter. It may also be observed that horizontal bends in tubes projecting from the sides of vessels diminish the discharges considerably. From the experiments of Venturi, it was found that with three tubes of equal diameters and lengths, of which one was straight, another in the form of a quadrant of a circle, and the third consisted of two parts at right angles to one another, the discharges were, to one another, as the numbers 70, 50, and 45.

The most remarkable circumstance respecting the discharge of water through adjutages, is that which took place when the tube consisted of two parts, one in the form of a cylinder, and the other a frustum of a cone diverging towards the extremity. The diameter of the cylinder was equal to that of the contracted vein; and this part was connected with the reservoir, at the orifice, by a short conic frustum having nearly the form in which the contraction takes place: the two diameters of the frustum, at the opposite extremity, were to one another as 1 to 1·8, but the length of this part was equal to nine times the diameter of the cylinder. The quantity discharged through such a tube was found by Venturi to be, to the quantity discharged through a simple orifice, equal in diameter to the cylinder, in the ratio of 24 to 10; and, to the discharge due to the height of the fluid, as 24 to 16. These results were confirmed by the experiments of Eytelwein and Hachette. The whole length of the tube must not however exceed a few inches.

ADMIRALTY, COURT OF. After the passing of the statute 28 Hen. VIII. c. 15, which put an end to the exclusive jurisdiction of the Court of Admiralty, offences committed on the high seas were tried under a commission specially directed for that purpose. By 7 & 8 Geo. IV. c. 28, offences tried in the Court of Admiralty are to be punished in the same manner as if committed on land, and there is a similar provision in 9 Geo. IV. c. 31. A still greater change has been effected by 7 Vict. c. 2, under which offences committed on the high seas are to be tried by the ordinary commissions of oyer and terminer, or general gaol delivery. The venue is to be the same as if the offence had been committed in the county where the trial is had. Maritime offences may, however, still be tried if necessary by commissions according to the act 28 Hen. VIII. In the act for establishing the Central Criminal Court (4 Wm. IV. c. 36) the judges are empowered to try in that court offences committed on the high seas and other places within the jurisdiction of the Admiralty of England, and to deliver the gaol of Newgate of persons committed for such offences. There is a clause in the act 7 Vict. c. 2, which preserves the jurisdiction of the Central Criminal Court as a Court of Admiralty. The Admiralty Sessions are held twice a year at the Old Bailey, in March and October. The Judge of the Admiralty presides, and two of the Common Law Judges sit with him. By 3 & 4 Vict. c. 65, the High Court of Admiralty is empowered to decide upon all matters and questions concerning booty of war which may be referred to it by the Privy Council. Before the passing of this act there was no court authorized to adjudicate respecting property captured by land forces, or booty, as it is commonly termed by writers on the law of nations; but when occasion required, commissioners were specially appointed for the purpose.

By § 108 of the Corporations Reform Act (5 & 6 Wm. IV. c. 76) all chartered Admiralty jurisdictions in England were abolished, but that of the Cinque Ports, attached to the office of Lord Warden, was expressly reserved. The Court of Admiralty for Scotland was abolished by 1 Wm. IV. c. 69, and the cases formerly brought before it are now prosecuted in the Court of Session or in that of the Sheriff, in the same way as ordinary civil causes. The inferior Admiralty jurisdictions of Scotland were not abolished by the above act.

The constitution of the Court of Admiralty has been affected by two recent acts, the 3 & 4 Vict. c. 65 and c. 66. The first of these acts empowers the Dean of Arches to sit as assistant to or in place of the Judge of the High Court of Admiralty, and admits to this court advocates, surrogates, and proctors of the Court of Arches. The Judge of Admiralty is authorized to make rules of court, and to enjoy all the privileges which pertain to the judges of the superior courts. The Court has power to adjudicate on claims for services and necessaries to ships which may not have been on the high seas but within the body of a county at the time when such services were rendered. It is empowered to direct issues on questions of fact arising in any suit to be tried before a judge of the superior courts of common law, and to direct new trials, or grant or refuse them, subject to an appeal. The 3 & 4 Vict. c. 66, is an act for regulating the salaries and in some respects the duties of the judge and officers of the court. It fixes the salary of the judge at 4000*l.*, with a retiring pension of 2000*l.* after fifteen years' service, or on becoming permanently disabled. It also prohibits the judge from sitting in parliament. The salary of the registrar is 1400*l.*, without fees. In time of war, or in case of a great increase of business, the registrar's salary may be increased to 2000*l.* He must perform his duties personally; but if, in case of illness or absence, he neglects for two days to appoint a deputy, the judge is empowered to appoint one, and to fix his salary, which is to be paid out of the salary of the registrar. The registrar is appointed by the judge, and must be a proctor of not less than ten years' standing. In case of necessity, the judge may direct the registrar to appoint an assistant, subject to the approval of the judge, with a salary of 1200*l.* One of the duties of the registrar is to attend the hearing of appeals befort the Privy Council, instead of the registrars of the Court of Chancery, on whom this duty devolved under 3 & 4 Wm. IV. c. 41. The marshal's salary is 500*l.*, without fees, and it may be increased to 800*l.* in time of war, or if the business of the court should increase. The fees of the court are carried to an account called the fee-fund, out of which all the officers are paid except the judge.

The business and fees of the Court of Admiralty are always much greater in time of war. From 1778 to 1782 Judge Marriot received 4500*l.* a year, the salary being 800*l.*, and the fees averaging 3700*l.* a year. On the return of peace his salary was increased to 980*l.*; and his total income during the peace averaged 1380*l.* a year. In 1794 the salary of the office was increased by the addition of 400*l.* a year. In the first ten years of the French revolutionary war, the income of Sir W. Scott averaged 5700*l.* a year, the salary being 2500*l.* and the fees 3200*l.* About a thousand cases a year were determined by the court during the war. (Evidence of Dr. Nichol before Select Committee on Admiralty Courts, in 1833; reprinted in 1843, by order of the House of Commons.) The Prerogative and Admiralty Courts were presided over by one judge on two occasions in the last century, from 1710 to 1714, and from 1773 to 1778. The Parliamentary Committee of 1833 recommended that the two judges of these courts should sit interchangeably, when occasion may require, either in one court or the other.

ADMISSIONS IN A SUIT are those facts or matters necessary to support the case of the plaintiff, or of the defendant, in a suit in equity, the necessity of proving which is removed by the opposite party admitting them.

Admissions are either, I. Upon the record, or II. By agreement between the parties.

I. Admissions upon the record are either, 1, *actual*, that is to say, positively contained in the pleadings; or, 2, *constructive*, that is to say, to be drawn by necessary inference from the form of the pleadings adopted.

1. The statements in a bill in equity, the truth or correctness of which is distinctly admitted in the answer, become thereby evidence for the plaintiff, and may be used by him to show the extent of the admissions made by the defendant. But when the bill contains a statement of an instrument, as of a deed or will, and the defendant, while he admits it to be to the tenor and effect set forth in the bill, refers to the document itself for greater certainty, he has a right to insist upon the document itself being read.

When a bill has been taken *pro confesso* against the defendant, under the stat. 1 Wm. IV. c. 36, it may be read in

ce against the defendant against whom it has been
wro *confesso*.

n answer, not only the simple admission of a fact, but
ement of a defendant that 'he believes,' or has been
ied, and believes' such a fact to be true, is sufficient,
when the statement is accompanied by some clause to
: its being considered as an admission. However, an
on to this rule is made as to the statement of an heir at
iat he believes a will to have been duly executed. In
se the court requires either a direct admission or proof
execution. The answer of an infant, being in fact the
of his guardian, cannot be used against the infant,
it may, it seems, against the guardian in respect of
n interest. But the rule is different with respect to
wer of an idiot or lunatic put in by his committee,
of a person of weak intellect put in by his guardian.
e cases admissions in the answers are evidence against
The joint answer of a husband and wife may be read
them in matters relating to the wife's personal estate;
ther the joint answer, nor the separate answer of the
l. with relation to her inheritance. The answer of one
nt is not evidence against a co-defendant, unless where
dant makes it so by referring to a statement in the
of his co-defendant.

courts of equity permit the plaintiff to read any portion
nswer which he thinks will support his case, provided
reading the admission of a fact, he reads at the same
r admissions or qualifications with which it is accom-
and the whole of the passage in which the admission
ned. The rule is different in courts of law, in which,
wer in equity is offered in evidence against a party, he
ht to insist upon the whole being read.

ith respect to constructive admissions, the most com-
tance of them is when a plea has been put in by a
nt, either to the whole or part of a bill; in which case
or that part of it which is pleaded to, and not contro-
y the plea, is admitted to be true. So when a special
on (a form now almost disused) is put in to an answer,
of the answer not denied by the replication are ad-
be true. Again, the statement of facts contained in
ff's bill is in equity, but not at law, constructive ad-
s against him of the facts as stated, when the allega-
hem is positive, as of his own acts, or of facts within
knowledge, though not when they are stated by
retence or hypothetical allegation, for the purpose of
n answer to an anticipated defence, with a protest
heir being considered as admitted; and the bill may
s evidence of the facts so positively averred, not only
it in which the bill is filed, but even in another suit,
of that the bill containing the statements was filed
privity of the plaintiff; which is necessary, because
on may file a bill in another's name. The right of a
t to read the plaintiff's bill is confined to the bill as it
pon the record, and therefore where the bill has been
the defendant cannot read the original bill in evi-
the facts of the case, though he sometimes may for
rposes.

: is great difference between actual and constructive
ns, in the manner in which they are presented to the
he former are read to establish the case of the party
them, in the same manner and at the same time as the
idence in the cause; the latter are stated to the court
e pleadings are opened, for the purpose of showing
the matters in issue between the parties, and what are
which by the form of the pleadings they are pre-
rom disputing.

ules as to admissions upon the record, whereby the
of evidence is precluded, are applicable to suits in
nly. (Daniel's *Practice in Chancery*, vol. ii. p. 395

dmissions by agreement between the parties are those
e parties or their attorneys or solicitors agree upon be-
emselves, for the sake of saving expense or preventing
They are usually made in writing, and signed by the par-
eir solicitors, but not necessarily so. Agreements for
ns will not be sanctioned by the court, if they violate
wn principles of law. Thus, there can be no agree-
admit a wife as a witness for or against her husband,
aive an objection to an instrument for want of a stamp.
same reason that an infant cannot be bound by his
he cannot be bound by admissions made on his behalf,
ch admissions are for his benefit.

ITTANCE. [Copyhold, P. C.]

ADULTERATION (from the Latin *Adulteratio*) is the use of ingredients in the production of any article, which are cheaper and not so good, or which are not considered so desirable by the consumer as other or genuine ingredients for which they are substituted. The sense of the Latin word is the same. (Pliny, *Hist. Nat.* xxi. 6.) The law does not consider adulteration generally as an offence, but relies apparently on an evil of this nature being corrected by the discrimination and good sense of the public. The selling of unwholesome provisions, as meat or fish, is punishable under most local acts; and is also an offence at common law. In Paris, malpractices connected with the adulteration of food are investigated by the Conseil de Salubrité, acting under the authority of the prefect of police. In this country, where the interests of the revenue are concerned, strict regulations have been resorted to in order to prevent adulteration. It is not, however, heavy customs or excise-duties alone which encourage adulteration, for the difference in price between the genuine and the spurious article, when both are free from taxation, presents great inducement to the practice. The following is an abstract of the law respecting the adulteration of some of the principal articles of revenue:—

Tobacco-manufacturers are liable to a penalty of 200*l.* for having in their possession sugar, treacle, molasses, honey, commings or roots of malt, ground or unground roasted grain, ground or unground chicory, lime, umbre, ochre, or other earths, sea-weed, ground or powdered wood, moss or weeds, or any leaves, or any herbs or plants (not being tobacco leaves or plants), respectively, or any substance or material, syrup, liquid, or preparation, matter, or thing, to be used or capable of being used as a substitute for, or to increase the weight of, tobacco or snuff (5 & 6 Vict. c. 93, § 8). Any person engaged in any way in the preparation of articles to imitate or resemble tobacco or snuff, or who shall sell or deliver such articles to any tobacco-manufacturer, is also liable to a penalty of 200*l.* (§ 8). The penalty for actually adulterating tobacco or snuff is 300*l.* (§ 1); and for having such tobacco or snuff in possession, 200*l.* (§ 3). The Excise-survey on tobacco-manufacturers, abolished by 3 & 4 Vict. c. 18, has been re-established in consequence of the extraordinary extent to which adulteration was carried.

The ingredients used in the adulteration of beer are enumerated in the following list of articles which brewers or dealers and retailers in ale and beer are prohibited from having in their possession under a penalty of 200*l.* (56 Geo. III. c. 58, § 2). These articles are—molasses, honey, liquorice, vitriol, quassia, cocculus Indicus, grains of Paradise, Guinea pepper, and opium; and preparations from these articles are also prohibited. They are used either as substitutes for hops or to give a colour to the liquor in imitation of that which it would receive from the use of genuine ingredients. By § 3 of the same act a penalty of 500*l.* is imposed upon any chemist, druggist, or other person, who shall sell the articles mentioned in § 2 to any brewer or dealer in beer. The penalties against dealers in beer in the above act are extended to beer-retailers under 1 Wm. IV. c. 64, and 4 & 5 Wm. IV. c. 85, which acts also contain special provisions against adulteration applicable to this particular class of dealers; and the licence also prohibits the sale of ale, beer, and porter, made otherwise than from malt and hops; or adulterated with drugs; or fraudulently diluted, adulterated, or deteriorated.

Tea, another important article of revenue, is protected from adulteration by several statutes. The act 11 Geo. I. c. 30, § 5, renders a tea-dealer liable to a penalty of 100*l.* who shall counterfeit, adulterate, alter, fabricate, or manufacture any tea, or shall mix with tea any leaves other than leaves of tea (§ 5). Under 4 Geo. IV. c. 14, tea-dealers who dye, fabricate, or manufacture any sloe-leaves, liquorice-leaves, or the leaves of tea that have been used, or any other leaves in imitation of tea; or shall use terra japonica, sugar, molasses, clay, logwood, or other ingredients, to colour or dye such leaves; or shall sell or have in their possession such adulterated tea, are liable to a penalty of 10*l.* for every pound of such adulterated tea found in their possession (§ 11). The 17 Geo. III. c. 29, also prohibits adulteration of tea (§ 1).

The adulteration of coffee and cocoa is punished with heavy penalties under 43 Geo. III. c. 129. Any person who manufactures, or has in his possession, or who shall sell, burnt, scorched, or roasted peas, beans, grains, or other grain or vegetable substance prepared as substitutes for coffee or cocoa, is liable to a penalty of 100*l.* (§ 5). The object of § 9 of 11 Geo. IV. c. 30, is similar. Chicory has been very extensively used in the adulteration of coffee in this country. This root, which possesses a bitter and aromatic flavour, came into use on the Continent in consequence of Bonaparte's decrees excluding colonial produce. Coffee with which a fourth or a fifth part of chicory has been mixed is by some persons preferred as a beverage to coffee alone; but in England it is used to adulterate coffee in the proportion of one-half. The Excise has for some time permitted the mixture of chicory with coffee. In 1832 a duty was laid on chicory, and this duty has been increased: chicory itself is also adulterated. Besides the quantity imported, chicory is also grown in England, and to prevent fraud it will be necessary to place the cultivation under some restriction, or perhaps, as in the case of tobacco, to prohibit the growth of it altogether.

The manufacturer, possessor, or seller of adulterated pepper is liable to a penalty of 100*l*. (59 Geo. III. c. 53, § 22). The act 9 Geo. IV. c. 44, § 4, extends this provision to Ireland.

In the important article of bread there are prohibitions against adulteration, though they are probably of very little practical importance. The act 6 & 7 Wm. IV. c. 37, which repealed the several acts then in force relating to bread sold beyond the city and liberties of London, and ten miles of the Royal Exchange, was also intended to prevent the adulteration of meal, flour, and bread beyond these limits. No other ingredient is to be used in making bread for sale except flour or meal of wheat, barley, rye, oats, buckwheat, Indian corn, peas, beans, rice, or potatoes, mixed with common salt, pure water, eggs, milk, barm, leaven, potato or other yeast, in such proportions as the bakers think fit (§ 2). Adulterating bread, by mixing other ingredients than those mentioned above, is punishable by a fine of not less than 5*l*. nor above 10*l*., or imprisonment for a period not exceeding six months; and the names of the offenders are to be published in a local newspaper (§ 8). Adulterating corn, meal, or flour, or selling flour of one sort of corn as flour of another sort, subjects the offender to a penalty not exceeding 20*l*. and not less than 5*l*. (§ 9). The premises of bakers may be searched, and if ingredients for adulterating meal or flour be found, the penalty for the first offence is 10*l*. and not less than 40*s*.; for the second offence 5*l*., and for every subsequent offence 10*l*.; and the names of offenders are to be published in the newspapers (§ 12). There are penalties for obstructing search (§ 13). Any miller, mealman, or baker acting as a justice under this statute incurs a penalty of 100*l*. (§ 15).

The above act did not apply to Ireland, where the baking trade was regulated by an act (2 Wm. IV. c. 31), the first clause of which, relating to the ingredients to be used, was similar to the English act just quoted. In 1838 another act was passed (1 Vict. c. 28), which repealed all former acts relating to the sale of bread in Ireland. The preamble recited that the act 6 & 7 Wm. IV. c. 37, had been found beneficial in Great Britain; and the clauses respecting adulteration are similar to the English act.

The several acts for regulating the making of bread within ten miles of the Royal Exchange (which district is excluded from the operation of 6 & 7 Wm. IV.) were consolidated by the act 3 Geo. IV. c. 106. Under this act any baker who uses alum, or any other unwholesome ingredient, is liable to the penalties mentioned in § 12 of 6 & 7 Wm. IV. c. 37. Any ingredient or mixture found within the house, mill, stall, shop, &c. of any miller, mealman, or baker, and which shall appear to have been placed there for the purpose of adulteration, renders him liable to similar penalties.

Other articles besides those which have been mentioned are adulterated to a great extent, and there is scarcely an article, from arrow-root to guano, which escapes; but perhaps the remedy for the evil is not unwisely left to the people themselves, who probably are less likely to be imposed upon when depending on the exercise of their own discrimination, than if a commission of public functionaries were appointed, whose duty should consist in investigating and punishing persons guilty of adulteration. The interference of the government in this country with the practice of adulteration, except in the case of bread and drugs [Apothecaries' Company, P.C.S.], has evidently had no other object than the improvement of the revenue.

Adulteration and the deceitful making up of commodities appear to have frequently attracted the attention of the legislature in the sixteenth century, and several acts were passed for restraining offences of this nature. The act 23 Eliz. c. 8, prohibits under penalties the practice of mixing bees'-wax with rosin, tallow, turpentine, or other spurious ingredient. The following acts have reference chiefly to frauds in the making up of various manufactured products:—3 Hen. VIII c. 6; 23 Hen. VIII. c. 17; 1 Eliz. c. 12; 3 & 4 Edw. VI c. 2; 5 & 6 Edw. VI. c. 6; 5 & 6 Edw. VI. c. 23.

ADVOCATES, or FACULTY OF ADVOCATES [Barrister, P. C., p. 504.]

AE'LODON, the generic title applied by H. von Meye to the fossil crocodile or gavial of Monheim.

ÆOLHARMO'NICA. [Harmonium, P. C. S.]

ÆOLI'NA, a very small musical instrument, consisting o a number of short elastic metallic laminæ, or springs, fixed i a frame, and acted on by the breath of the performer. Th best of the kind comprise three octaves of diatonic sounds, an are also capable of giving the three simple harmonies of th key. This instrument was the first formed on such a principl that appeared here, and became exceedingly popular in ever sense of the word, but was very speedily superseded b a much more perfect thing of the kind, the Accordion, an has already fallen into disuse. [Accordion, P. C. S.; Concertina, P. C. S.]

ÆOLO'DIKON. [Harmonium, P. C. S.]

ÆO'LOPHON. [Harmonium, P. C. S.]

ÆPI'NUS, FRANCIS MARIA ULRIC THEODORE a celebrated electrician of the eighteenth century, who w born at Rostock in Lower Saxony, December 12, 1724, bu of whose life few particulars have been preserved: he died a Dorpat in Livonia, in 1802.

Several memoirs by Æpinus, relating to mathematical an philosophical subjects, were printed in the 7th, 8th, 9th, an 10th volumes of the 'Novi Commentarii Petropol.,' and i the 'Mémoires' of the Berlin Academy for 1755 and 175 In the volume for the latter year, and also in a 'Recueil d Mémoires' published at St. Petersburg in 1762, is his paper entitled 'De quibusdam Experimentis Electricis,' &c., whic contains the discovery of the electrical polarity of tourmalin a mineral which has since been so much noticed on account o its properties with respect to polarized light. Æpinus foun that on exposing a piece of the mineral to a heat between 99 and 212° Fahrenheit, one extremity of it acquired the vitreou and the other the resinous electricity. In the tenth volume o the 'Novi Comment.' is his paper concerning the effect o parallax on the duration of a transit of Venus over the disk o the sun, in consequence of the position of the observer on th earth's surface; and in the same volume is one on the accidental colours produced by looking directly at the sun. Als in the twelfth volume of the same work there is contained a account of the electrical properties of the Brazilian emerald, crystal which has been since found to be merely a variety o tourmaline. In 1758 he published at St. Petersburg a academical discourse concerning the similarity of electricit and magnetism; and in 1761, at the same place, a treatise entitled 'Cogitationes de Distributione Caloris per Tellurem.'

But Æpinus is chiefly distinguished by his 'Tentame Theoriæ Electricitatis et Magnetismi,' which, in 1759, wa published also at St. Petersburg. In this work he sets out b assuming that there exists in all bodies a fluid whose particl mutually repel one another with forces decreasing as the distances between them increase, and, according to the same la attract the particles of the bodies with which they are in combination. He assumes also that the electrical fluid penetrat with difficulty through the bodies called electrics, as glas resin, &c.; and that it meets with no sensible obstruction passing through such as are called non-electrics or conductor as the metals, unbaked wood, &c.: and he has succeeded showing, by the strict processes of mathematical analysis, th the phenomena of electricity depend chiefly on the tenden of the fluid to attain a state of equilibrium, by passing from body which contains an excess to those about it which m have less than the natural quantity. The intricate subject the distribution of electricity and magnetism on the surfaces bodies of given forms, as spheres or spheroids, is however l untouched; and though the results of the investigations, so f as they extend, accord satisfactorily with phenomena, y there remains an unsurmounted difficulty in the fact th when a body is deprived of the electrical fluid, its partic are held together by cohesion, while the theory requires in such a state the particles should exert on one another pulsive forces.

In the 'Philosophical Transactions' for 1771 there is elaborate paper containing a mathematical theory of el tricity, on the same principles as those assumed by Æpin, which was written by Mr. Cavendish without any knowled of what had been previously done by the continental phi sopher. And an abridgment of the Theory of Æpinus w published by M. Häüy in 1787, under the title 'Exposition de la Théorie de l'Electricité.'

Æpinus discovered the means of charging a plate of air with electricity, when it is confined between two boards. He appears to have directed his attention to mechanical subjects; for he discovered that when any forces, acting upon the arms of a balance, keep them in equilibrio, the sum of the forces, decomposed in the direction of the arms, is a maximum.

(*Biographie Universelle.* The brief notices of the discoveries of Æpinus are taken from the works named above.)

AERIAL IMAGES. This name is given to those which are caused by the convergence of reflected or refracted rays of light, when they appear to be suspended in the air.

The images which are caused by the refraction of light in the strata of air near the surface of the earth or sea, when these strata, from heat or moisture, differ considerably in density from the strata above them, have been described under MIRAGE, P. C.; and it is intended here to mention only those which are perceived on looking in or towards a concave mirror.

If an object be placed, or if a spectator place himself, directly in front of such a mirror, at a greater distance from it than the centre of its curvature, the pencils of light diverging from points on the surface of the object, or from that part of the spectator's person which is turned towards the mirror and is not very far from its axis, will, after reflexion, converge to corresponding points between the object or spectator and the mirror, and will constitute an inverted image of either. Now, let the spectator be himself the object: then the rays in each pencil, crossing one another at the image, and falling afterwards in a divergent state on his eye, will produce vision of the image; but those which enter the eye being in this situation few in number, and the eye not being capable of making the diverging rays unite on the retina, the image will appear faint and indistinct: in these circumstances also it usually appears to be within or behind the mirror.

But, as the spectator approaches the mirror, the reflected rays which form the image converge less rapidly, and meet at a greater distance from the mirror in its front; the eye at the same time, being nearer the image, receives pencils which are reflected from parts of the mirror at greater distances from the axis, so that the image appears both greater and more distinct; and if the mirror be at least 18 or 20 inches in diameter, the image of the spectator will be seen hanging in the air, in an inverted position, between himself and the mirror.

If, while the spectator is yet farther from the mirror than the centre of curvature, he advance his hand towards the mirror, the hand of the image will seem to advance to meet it; and at a certain place, which is the centre of the mirror's curvature, since there the rays in the pencils which proceed from the hand will be reflected back in the same lines, the hand and its image will appear to coincide. In this situation the inverted image of the spectator will be very distinctly seen between the mirror and his hand.

If the spectator now advance towards the centre, the image will advance to meet him, but it will become indistinct, and at the centre it will be entirely lost. Proceeding beyond the centre towards the mirror, the reflected pencils will converge to points beyond the centre in the opposite direction, that is, behind the spectator, and the rays of the pencils will enter the eye before they can unite to form the image: then the spectator will perceive the reflexion of himself in the mirror in an erect position; and the figure will become more distinct as he approaches nearer to the mirror, since the reflected rays in each pencil approach nearer to parallelism, and become quite so when he is at the principal focus, or midway between the mirror and its centre of curvature.

ÆTHERS. The most common of these, with the methods of preparing them, have been previously described in P. C. vol. i. p. 159. It is intended here only to notice the medical uses of those long known, with a few of those more recently introduced. The first to be treated of, after giving a brief general view of their modes of action on the human system, is sulphuric æther, which is always understood to be the one indicated when the term æther is employed absolutely. The German chemists and therapeutists designate them *naphthae*, a term liable to cause them to be confounded with *bitumens*. Æthers present the most perfect examples of volatile stimulants, being unequalled for rapidity of action, when immediate aid must be imparted to the muscular system, especially the involuntary muscles, by augmenting the nervous power, and by quickening its development. Whether they effect this by a direct impression on the nerves, or by previous absorption into the circulation, it is very difficult to determine, since most of them are absorbed so rapidly, as almost instantly to mix with the circulating mass. They bear the greatest resemblance to alcoholic stimulants; but are distinguished by more instantaneous effects. These however are more transient, and a more frequent repetition of the dose is therefore required. Fatal results are less likely to follow from large doses of æther than of alcohol, a fact which can only be accounted for by the excess being more speedily thrown out of the system, especially by pulmonary and in some degree by cutaneous exhalations; for the more highly carbonized constitution of æther would lead us to expect a contrary result. This furnishes the proper guide for the treatment of cases of poisoning by them, viz. placing the patient where he may respire as pure air as possible, and in the light, carrying on artificial respiration if needful, occasionally dashing cold water on the face and temples, and cautiously using venesection or cupping. Transmitting a galvanic current of a moderate force along the eighth pair of nerves is often beneficial. Perseverance in the use of these means for hours is frequently successful. Sulphuric æther is the most powerful of ætherial preparations, and therefore of diffusable stimulants. It is distinguished from the others likewise by having less secondary effects upon the system. Hence it is more employed for its primary effects than for both primary and secondary effects. It is of a peculiar, strong, penetrating, rather agreeable odour; the taste is at first cooling, afterwards hot, leaving a feeling of dryness in the mouth and throat. Its volatility is very great, and though it does not excite redness of the mucous membrane of the stomach in a moderate dose, yet being quickly changed into vapour by the heat of that organ, it causes contraction of its muscular coat, and expulsion of gas, thus acting as a carminative, or it produces most painful distension if that viscus be not powerful enough to resist its local action, and is followed by slight cerebral excitement, and even a feeling similar to intoxication may be experienced, which however soon passes off, without leaving any marked depression; though a disposition to sleep, and sometimes tendency to perspiration, are the ultimate consequences. The lungs are the common channel by which it is eliminated; this æther having less influence on the kidneys or skin than the other sorts. If spasm, irregular action, or debility of the organs of circulation, respiration, or digestion, existed previous to its administration, these generally disappear speedily, or are alleviated by its use. Hence it ranks as an antispasmodic of the highest kind. It is therefore resorted to in all cases of imminent danger, from difficulty of breathing, colic, flatulence, and deep depression, such as occurs in cholera Asiatica, or the later stages of fever. In relieving paroxysms of asthma it is unrivalled, and may be inhaled along with the vapour of warm water, or by being dropped on a portion of sugar held between the teeth. Like all stimulants, habit diminishes its influence on the system, so that the dose requires greatly to be increased. So much as two ounces have been taken by an adult in twenty-four hours. This is hazardous, and the necessity for it may be diminished by alternating sulphuric æther with some of the other æthers, which, though little known or used in this country, are found very effectual by the German, French, and American practitioners. An increase of our ætherial preparations would be a valuable accession to our curative agents. Economy and physiology alike recommend this proceeding. The great solvent power of sulphuric æther renders it an eligible menstruum for the administration of a variety of articles; by these its own powers are heightened. It has also been attempted to take advantage of its power in this respect, by employing it in cases of biliary calculi, not merely to alleviate the agonizing pain, but from a belief that it would dissolve the calculus, and so lessen its bulk. Oil of turpentine is a good addition. It has also been recommended against tape-worm, from a notion that the volatilized æther would greatly annoy the worm, and allow it to be easily removed by a dose of castor oil or other purgative. This is not free from inconvenience and even danger to the feeble persons who are infested with the tape-worm. The antispasmodic powers of æther are much increased by adding tincture of opium, or a solution of the hydrochlorate of morphia. This combination furnishes the most effectual means of warding off a paroxysm of hysteria or epilepsy, if administered promptly. This is an object of great moment, as every fit, if allowed to take place, predisposes to a recurrence of them. Externally, æther is applied to the temples to relieve nervous headaches; and also over hernial tumours, in order that by the cold consequent on its evaporation the hernia may contract and be reduced: a portion of thin oiled silk should lie interposed between the æther and the skin.

Sulphuric æther is rarely found in the shops perfectly pure. The casual or intentional adulterations interfere more with its chemical properties as a solvent of various substances than with its medicinal powers. Time however resolves it, particularly if kept in the light, into acetic acid and alcohol. It ought therefore to be recently prepared, and preserved in an obscure place. The spirit of sulphuric æther is only a weaker form, with some ætherial oil, of the pure æther.

Nitric or hyponitrous æther is never employed pure in medicine, but only as the spirit of nitric æther. This has considerable resemblance to the sulphuric æther, but is more miscible with water. It likewise has more marked secondary effects, especially on the kidneys and skin. Hence it is much employed as a diuretic. Its impression on the organ of taste is aromatic, sweet, and cooling, and it is known familiarly as the *sweet* spirit of nitre. Its restorative action is neither so quick nor so certain as that of sulphuric æther; but where dropsical effusions co-exist with disease of the heart, it merits the preference. It is charged with uncertainty as a diuretic, less perhaps from its own nature than from want of accurate discrimination of the varieties of condition both of the system at large and of the kidneys, when diuretics are indicated, and from the very common error of mingling in the same formula medicines of very opposite modes of action, though each singly may be diuretic. [DIURETICS, P. C.] The vapour of this, as well as of sulphuric æther, when copious, has proved fatal to those exposed to it. All bottles containing them should be kept well stopped or corked. Sweet spirit of nitre is a useful addition to copaiba both as aiding to convert it into the form of mixture, and as a diuretic for diluting the acrimony of the urine, where copaiba is given in diseases of the bladder and urethra. (Christison.) Nitric æther is often fraudulently added to malt spirits to give them the flavour of French brandy. (Paris.)

Chloric æther is also markedly diuretic. It is a most valuable analeptic in the sinking stages of fevers, and much commended by Dr. Copland (see his Dictionary, vol. i. p. 927) and the best American physicians. By them it is much used in asthma, and asthenic diseases of various kinds.

Acetic æther is a very agreeable stimulant, possessing a grateful odour, resembling Rhine-wine, and a cooling, aromatic, somewhat bitterish taste. Its action is similar to that of the other æthers, and though not so potent, it is more agreeable to take. Its long continued use however oppresses the digestive organs. Nevertheless it deserves to be employed in adynamic fevers, its action on the skin rendering it very advantageous. In tendency to fainting it is very serviceable; also in asphyxia. In some local affections it is of great utility applied in the form of vapour, such as some forms of deafness. (See Pilcher *On the Ear*.)

Phosphoric æther is a valuable restorative in the paralytic stage of fever.

AESHNA. In this recent genus of Libellulidæ Mr. Strickland ranks a fossil insect from the lias of Warwickshire.

AETHOPHY′LLUM, a fossil genus of plants from the keuper. (Brongniart.)

AË′TION (Ἀετίων), a celebrated Greek painter, and, according to Lucian, one of the best antient colourists; that writer mentions Aëtion, Apelles, Euphranor, and Polygnotus as the most successful of the antient Greek painters in the mixing and laying on of colours. Aëtion's exact time is uncertain, although from the manner in which he is mentioned by Lucian, notwithstanding the names he is associated with, he lived probably in Lucian's own time, or at most very shortly before him. He speaks of him as the most distinguished painter of his time, and describes a very celebrated picture by him of the marriage of Alexander and Roxana, which the painter exhibited at the Olympic games, and which pleased Proxenidas, one of the judges, so much that he gave Aëtion his daughter in marriage. 'It may be asked,' says Lucian, 'what was there so marvellous in that painting, as should induce a man of such high rank to reward the painter, who withal was a stranger, by bestowing on him his daughter? The picture is still in Italy, and I am able to speak of it from personal inspection. It represents an extremely magnificent bed-chamber with a nuptial bed. In it is seen sitting Roxana, the most beautiful virgin that can be conceived. Her eyes are modestly fixed on the ground before Alexander, standing near her. She is surrounded by several smiling Cupids. One of them behind her lifts up the bridal veil from her forehead, and shows it to the bridegroom. Another, in the attitude of a slave, is officiously employed in drawing off her sh
she may no longer be detained from lying down.
has hold of Alexander's robe, pulling him with all h
towards Roxana. The king presents the maiden with
and beside him stands Hephæstion as a brideman, h
lighted torch in his hand, supported by a wonder
youth, whom I guess to represent the god of marriage
name is not beneath. On the other side of the p
drawn several more Cupids, playing with the arms
ander. Two of them carry his spear, and seem alm
burdened with the weight of it. Another couple
buckler, with a figure like the king stretched upon it,
it along by the handles. Another creeps backwards
coat of mail, where he seems to lurk in order to frig
two little porters as they come on.' 'These collate
dents,' continues Lucian, 'are by no means the mere
ness and idle sport of the artist's fancy; they are to s
martial disposition of the bridegroom, and that his
Roxana had not effaced his passion for arms and militar
(Tooke's Translation.)

From this description Raphael is said to have
design, of which there are duplicates or copies, an
executed in fresco, in the so-called Villa of Raphae
garden of the Villa Borghese at Rome; but the com
is puerile, and does not at all merit the praises whic
has given to the antient performance of Aëtion: it
several times etched or engraved, by J. Caraglio,
and others.

Lucian in the above description remarks, that he
fine youth to represent the god of marriage, *as the na*
beneath. He alludes to an antient custom which
among the Greeks, of attaching the names in their p
the figures represented; the names in most cases
bably written below the feet of the figure. In the pi
vases we find the name sometimes written by the si
figure, but the practice was not universal. In this c
Lucian's remark, it would seem that some of th
had names attached to them, as he speaks of the ot
racters with certainty, and guesses only at the god of
because there was no name attached. It was a practi
ever, seldom if at all had recourse to in later times
case of its employment the name was probably so
not to disturb the pictorial effect. Sometimes senten
inscribed on pictures, as for instance Zeuxis wrote
picture of Helen three lines from Homer, celebr
extraordinary beauty. (*Iliad*, iii. 156-158; Valerius
iii. 7, § 3.) There are similar examples on work
middle ages, and also of much later times: inscriptio
allegories are very common.

The circumstance that Pliny has not mentioned
an additional reason for concluding that he lived about
own time, or in the early half of the second centur
æra, subsequent to Pliny. Some however have
that the Echion of Pliny and Cicero is the Aëtion of
especially as the former was celebrated for a picture
distinguished for the modesty of her expression;
implies a great blunder in Lucian, who speaks of
painter of his own time, and there is no sufficient
such a supposition.

(Lucian, *Herodotus* or *Aëtion*, *De Mercede Cond*
and *Imag.* 7; Pliny, *Hist. Nat.* xxxv. 10. 36;
Brutus, 18; *Parad.* v. 2.)

AË′TIUS (Ἀέτιος), of Amida in Mesopotamia,
writer on medicine, who probably lived about the en
fifth and the beginning of the sixth century of our
may infer from the persons whom he mentions in
He studied medicine at Alexandria, then the seat of
celebrated medical school, and afterwards he went to
tinople, where he appears to have been raised to a hi
at the court, since Photius (*Biblioth. Cod.* 221)
κώμης ὀψικίου, that is, *comes obsequii*, a title belongin
principal officers attending upon the person of the
Aëtius was a Christian, but not free from the sup
which at that time were introduced into Christian
Egypt, and which were connected with his professio
work contains some curious examples of the pretensio
diseases by means of superstitious ceremonies. The
Aëtius which has come down to us entire bears th
Βιβλία ἰατρικά or *βιβλίον ἰατρικόν*, and consists of
The whole however was afterwards divided by som
into four sections, each of which contained four boo
which the work is also called Tetrabibli (Τετράβιβλο
cording to Photius (*l. c.*), who gives a brief summar

work, it is a compilation made from the writings of Oribasius, Galen, Archigenes, Rufus, Dioscorides, Herodotus, and other eminent medical authors; but the compilation is made with judgment, and Aëtius appears to have introduced into it many new and original things. The book is a kind of systematic encyclopædia of medicine, embracing the whole range of medical and surgical knowledge of the antients. A complete edition of the Greek original has never yet been published. The first eight books appeared at Venice (1534, fol.), but the second volume, which was to contain the remaining eight books, never made its appearance. Particular chapters on separate subjects have been edited at different times; but an edition of the whole, though it has often been contemplated and promised, has not been made. The Latin translations are numerous. One by Janus Cornarius, containing books 8, 9, 10, 11, 12, and 13, appeared at Basel (1533, fol.), and one of the remaining 10 books, by J. B. Montanus, was published at Basel (1535) in 2 vols. fol. Complete translations of the whole work appeared at Venice (1534, 4to., 1543, &c., 8vo.), Basel (1534 and 1539, fol.), Lyon (1549, fol.), and at Paris (1567, fol.) among H. Stephens's 'Medicae Artis Principes.'

(Fabricius, *Biblioth. Graec.* ix. p. 228, &c., where a full account of the modern literature on Aëtius is given.)

AETO'BATES. Two species of this genus of Rays occur in the London clay of Sheppey. (Agassiz.)

AFFEERERS. [LEET, P. C.]

AFGHANISTAN, or the country of the Afghans, comprehends the eastern portion of the table-land of Iran, and lies between 28° and 35° 30′ N. lat., and between 62° and 73° E. long. It extends from north to south about 450 miles, and more from east to west; its mean width, near 31° N. lat., is about 470 miles. This gives an area of more than 211,500 square miles, so that it is somewhat larger than France. To the north of it is Turkistan, to the east the Panjab, to the south Beloochistan, and to the west Persia. Beloochistan is properly a part of Afghanistan, but is at present politically separated from it.

Afghanistan is an elevated table-land, the eastern base of which is washed by the Indus river. A comparatively narrow tract of low ground divides the river from the mountain-masses which constitute the eastern edge of the table-land. These masses generally rise with a steep acclivity to an elevation of about 6000 feet above the sea, and on their summit the table-land extends westward to the boundary-line of Persia. But in proceeding in that direction the elevation of the table-land diminishes, so that along the western boundary-line of the country it is probably less than 3000 feet above the sea-level, except towards Beloochistan, from which it is divided by a range which seldom sinks below 5000 feet and often rises to 9000 feet. These masses however are not extensive, nor can they be called very elevated when compared with the elevated mountain-region which encloses the table-land on the north. These mountains rise in some parts to 18,000 and 20,000 feet, and may be considered as an offset of the Himalaya mountains of Hindustan. In Afghanistan they form four mountain-regions, which from east to west are known by the names of Hindoo-coosh, Pughman Mountains, Koh-i-Baba, and Paropamisus. The last name is taken from the Greek authors. The mountain-regions to which it is applied are now known as the Mountains of the Hazarah and Eimack, from the names of two tribes that inhabit them, and in history are mentioned as the Ghor mountains. The southern declivity of all these northern mountains is mostly included within the boundaries of Afghanistan, and it is not near so rapid as the northern, which sinks down to the plains drained by the Amoo or Oxus river, which are at least 3000 feet lower than the table-land.

Surface; Soil; Rivers:—Northern Mountain-Regions.—I. Between 35° and 34° N. lat. the Indus runs in a south-south-west direction, and between two very elevated mountain-ranges, of which the eastern is undoubtedly a part of the Himalaya mountains; and as the western is a direct continuation of this great range and resembles it in other respects, the name of Himalaya mountains is now also applied to the western mountains as far as 70° E. long. This range however, which runs from east-south-east to west-north-west, though it rises in some places as high as 20,000 feet above the sea-level, does not constitute the water-shed of the rivers of this mountain-region, which occurs farther to the north in a range that runs nearly due east and west, and appears to be a continuation of the great mountain-range called Kuenluen, which traverses the interior of Asia between 36° and 35° N. lat. This continuation of the Kuenluen is called in Afghanistan, the Hindoo-coosh. As the Himalaya mountains and the Hindoo-coosh do not run parallel, but converge, they unite in one mountain-mass between 70° and 69° E. long. The country included by these two ranges is called Kaferistan. It includes the northern declivity of the *Western Himalaya Mountains*, the southern only belonging to Afghanistan. When seen from the plains at their base, these mountains rise in terraces; the northern and higher mountain overtopping the southern and lower, and thus at some places four ridges are visible. The valleys which are enclosed within this range are of considerable width, but the cultivable soil is confined to a narrow strip along the line of drainage. The space between the higher portion of the ridges and the base of the hills is an inclined plane, sometimes very wide, strewed or entirely covered with boulders and shingle without a particle of soil. But the declivity of the hills is covered with a rich soil of considerable depth, the bare rock being only exposed where the inclination of the upper strata approaches so near the perpendicular, that no lodgement of soil can take place. A considerable portion of these declivities is under cultivation, and the remainder, to an elevation of 10,000 feet above the sea-level, is overgrown with high forest-trees; near the base and to an elevation of 4500 feet above the sea the forests consist of baloot, a species of oak, but above that line they are mixed with zaitoon, a species of olive. The last-mentioned species forms the chief if not the only forest-tree as high as 6500 feet, where it is gradually replaced by the deodara, a species of fir. The forests that cover the Himalaya mountains are the most extensive in Afghanistan.

Near 70° 12′ E. long. and 37° 55′ N. lat., where the Himalaya already seem to be connected with the Hindoo-coosh, the nature of the mountains changes suddenly. The valleys indeed do not differ much in extent and fertility, but the sides of the mountains are destitute of trees. They are almost entirely devoid of soil, and the rocks project in every direction, and the intervening places are strewed with angular débris very little comminuted. These slopes are never cultivated, and sustain nothing but arid and thorny bushes, which almost invariably stand alone. Such is the nature of the Hindoo-coosh as far west as 68° E. long., where that high summit or rather mountain-pass occurs which properly is called Hindoo-coosh, and has given name to the whole range, and rises to more than 15,000 feet above the sea-level. There are however many other peaks which are always covered with snow. Some of the valleys included in this range are very populous. The best known is that of Panchshir, through which one of the roads passes which lead from Kabool to Kunduz, and which at the upper end of the valley traverses a mountain-pass, 13,200 feet above the sea, called the mountain-pass of Khawack. The valley of Panchshir, its sinuosities included, is 70 miles long, and in most places about a mile and a half wide; no part exceeds twice that breadth. The upper part of it, about 25 miles, is not inhabited, probably on account of the severity of the cold in winter, but in the lower part there are seven thousand families. The soil is naturally sterile, and the land fit for cultivation only to a small extent, but every foot of it is cultivated. The orchards and the mulberry plantations constitute the wealth of its inhabitants; the mulberries are dried, and yield a good flour, which forms the principal food of the people. Another road, which traverses the Hindoo-coosh and leads to the plains of the Oxus, lies farther west, and runs through a similar valley watered by the river Parwan. The mountain-masses are at least as high as the Pass of Khawack.

The high summit of the Hindoo-coosh above mentioned terminates the range just described. At this point the range changes its direction, running nearly due south between 35° and 34° 20′ N. lat., and decreasing somewhat in elevation. This portion of the range goes by the name of the Mountains of Pughman. It consists of two parallel ridges, and includes a valley more than 10 miles in width, which has a hilly surface, and seldom sinks so low as 10,000 feet above the sea. This valley is unfit for cultivation on account of its elevation, but it is the favourite resort of the nomadic tribes in its vicinity in summer time, on account of its excellent pastures. The two ranges which enclose the valley are from [illegible] to 3000 feet higher. As these ranges are free from snow in summer, several passes lead over them to the valley of Bameean, which is west of the western range and [illegible] feet above the sea. The best known of these passes are those of [illegible] of [illegible] which attains 12,[illegible] feet and that of K[illegible], which is 12,481 feet above the sea-level.

The Koh-i-Baba range may be considered as [illegible] ment of the Paropamisus; north of it lies the mountain-region of the Hazarah. The Koh-i-Baba is not a mountain-region, but a single range, which rises suddenly where the Pughman mountains terminate (near 34° 20′), and hence runs due west. At its eastern extremity it presents an immense mass of rocks, overtopped by three snow-clad peaks. The great mass attains an elevation of about 14,000 feet above the sea, and the peaks rise about 1000 or 1500 feet higher. Patches of snow are found on it in sheltered elevations at 13,500 feet, and towards the summit there are beds of great extent. Farther westward the range presents a succession of lofty peaks, but it is not known how far they extend; it is however certain that no continuous range is found in the country of the Eimack, about 150 miles from the eastern end of the Koh-i-Baba. These mountains are barren, for the rocky masses have no covering except angular fragments of rocks which cover the declivities.

To the north and west of the Koh-i-Baba are the mountain-regions of the Hazarah and Eimack, which occupy, including the Koh-i-Baba, the whole country between 34° and 36° N. lat. and between 68° and 63° E. long., comprising an area of nearly 50,000 square miles, equal to the extent of England without Wales. The eastern part, or that which is north of the Koh-i-Baba, and is in possession of the Hazarah tribes, is the more elevated. Its surface presents a succession of high mountains with rather gentle slopes, which are traversed by numerous open valleys of moderate width. The declivities of the mountains are covered with a soil which produces abundance of grass, and various shrubs and herbs, but is destitute of trees. Some of the higher valleys can also be used only as pasture-ground; in the lower valleys barley is cultivated, and in the lowest good crops of wheat, barley, and millet are obtained. The domestic animals are horses of a small breed, cattle, and sheep, but as the country is so high the climate is very severe, and the Hazarahs are obliged to cut great quantities of grass for their sheep, which during three months of the winter usually sleep under the same roof with their master. The general level of this country appears to be about 10,000 feet above that of the sea.

The mountain-region of the Eimack does not materially differ in its surface and soil from that of the Hazarah, except that the mountains are less elevated: their general level does not much exceed 9000 feet above the sea. The valleys also sink deeper, and are fitter for cultivation, which is also carried on to a greater extent, but even here the produce of the domestic animals constitutes the wealth of the population. They are not obliged to procure winter fodder for their sheep and cattle in such large quantities as the Hazarahs, for in the valleys, to which they return in autumn from the mountains, grass is commonly found in sufficient quantity. In summer, in this region, as well as in the country of the Hazarah, the pastures are so abundant, that several tribes of Dooranees, which inhabit the Zemin Dawar, or the country between these mountain-ranges and the river Helmund, bring their flocks to these higher regions, because at that season the grass in their own countries is burnt up.

II. *The Valley of the Kabool River.*—This valley lies along the southern base of the eastern portion of the mountain-region just described, beginning on the west at the foot of the Pughman mountains, and stretching eastward to the banks of the Indus river, through a space measuring nearly 200 miles in a straight line. At its western extremity the valley is about 10,000 feet above the sea-level; but where it terminates on the Indus its elevation does not exceed 750 feet.

The southern boundary of the valley is formed by an uninterrupted chain of heights varying in elevation. This chain is not connected by any ridge with the Mountains of Pughman, but separated from them by a narrow plain called the Valley of Mydan, which is 7747 feet above the sea-level, and is well cultivated, and covered with orchards and fields. Through this plain the road runs from Kabool to Ghuznee and Kandahar. On the east of the road rise some hills of moderate elevation, which at first are rather isolated, but soon unite in a continuous chain. Baber describes them as low, with little grass, bad water, and not a tree on them; and adds that in the whole world he had not seen such a dismal-looking hill-country. This is commonly the case with mountain-regions that contain great metallic riches. During the British occupation of the country it was discovered that extensive beds of very rich copper-ore exist in many places, though the natives only work them to a small extent. These hills change their aspect about 20 miles from Mydan, at Tezeen, where they rise higher and are covered with trees. East of 69° E. long. these mountains attain their greatest elevation in the Sufaid-Koh, or White Mountain, which is covered with snow all the year round. This elevated rocky mass appears to extend 30 or 40 miles from west to east, and perhaps half as much from north to south. Its summit rises about 16,000 feet above the sea. The declivities of this mountain, to an elevation of more than 10,000 feet, are covered with forests, especially the species of deodara; and near the base are plantations of fruit-trees. In some places they are cultivated, and the pasture-grounds are extensive and good. From the snow there rise numerous streams, which preserve a considerable volume of water all the year round, an inestimable advantage in a country which has a dry air, and where in summer the largest rivers, when they have not a similar supply of water, dwindle down to mere brooks. The high mountains appear to terminate near 70° E. long., and the range of lower mountains which runs hence eastward to the Indus is called the Kyber or Tira range. Near the Sufaid-Koh these heights certainly rise to 10,000 feet; but they grow lower farther to the east, and where they terminate on the Indus with a precipitous declivity they can only be called high hills. This portion of the range descends with rather rapid slopes towards the north, and its sides in many places are bare, but in others clad with a scanty grass, except after the great rains in July and August, when the grass is abundant. Cultivation is limited here, but their tops, which present plains of moderate extent, have a deep soil, which yields good crops where it can be irrigated.

The Kabool river originates at Sir-i-Chusmah, about 37 miles west of the town of Kabool, drains the Mydan valley, and passes through the town of Kabool, where it is an insignificant stream. Below the town it is joined by two more considerable rivers, the Logur on the south, and the Ghorbund on the north. On leaving the plain of Kabool it enters the mountainous district which divides the basin of Kabool from that of Jellalabad, and in this part of its course the river descends about 4000 feet in a space of 30 miles in a straight line, and its banks are lined with rocks; there are also rocks in the bed of the river. Two or three miles below Jellalabad the Kabool is joined by the large river which drains the Koonur valley in the Himalaya range, and is generally called Koonur. The Kabool river then ceases to be fordable. Leaving the Jellalabad basin it enters another mountainous tract, and it emerges from it at Mucharr into the Plain of Peshawur, or Peshawr, where its current is very moderate. A short distance below Mucharr it divides into two branches: the lesser, or Shuhalum river, passes only four miles north of Peshawur, and unites, 25 miles in a straight line from the point of division, with the Hadezy, or other branch. After a course of thirty-five miles more it enters the Indus. The island formed by the two branches is inhabited by a tribe called Daoodzyes, and called after them. In its upper course the Kabool river is not navigable, and of no importance except for irrigating the contiguous fields. Small poplar timber is floated down the Logur during the floods for the consumption of Kabool. From Jellalabad downwards the river supplies the means of safe and generally rapid descent. It is navigated by rafts floated on inflated skins, which are admirably adapted to the rivers of Afghanistan. During the floods the distance between Jellalabad and Peshawur may be traversed in 12 hours, which by land is not less than 100 miles. The conveyance of goods on such rafts holds out a prospect of enlarging the navigability of the Indus river itself. No river vessels can ascend this last-mentioned river farther than Kalabagh, the current between that place and Attock being too rapid. But the rafts would experience no difficulty in proceeding to Kalabagh, and there discharging their loads into the boats which navigate the Indus. The Kabool river is lowest in the winter, notwithstanding the heavy rains which in that season fall in the Plain of Peshawur. It is sensibly affected by the spring rains in February and March. It falls after they have passed over, but not to its level in the winter, for at this time the snow of the lower hills begins to thaw. At the end of May the middle snows begin to descend, and after them the upper snows, which bring the river to its greatest height in the beginning of August. In September the waters begin to decrease, and in the beginning of December they sink to the lowest level.

The Valley of the Kabool river contains three basins, which are divided from each other by two extensive mountain-regions. The three basins receive their names from the principal towns, and are called, from west to east, Kabool, Jellalabad, and Peshawur. Of the two mountain-regions between them, the western is called Lattabund, and the eastern Kyber, from the two most frequented passes which lie across them.

in of Kabool extends about 36 miles from west to
from 8 to 16 miles in the opposite direction. It
by two ridges of hills into three plains. The town
is built at the base of a ridge of hills which runs
plain from south to north, and through which the
er passes by a gorge. From its highest summit,
t-i-Shat, at the foot of which Kabool stands, the
e has obtained the same name. That portion of
hich lies west of the Tukt-i-Shat ridge is called
eh. It is about 8 miles wide and 12 long.
ry fertile tract, presenting one continuous mass of
d a succession of extensive orchards and meadows,
ich a great number of villages are dispersed; they
ded by cultivated fields, divided from one another
poplar and willow. Fruit is so abundant that the
ple live entirely on it for many months of the
h corn is raised to a considerable amount.
ern and wider portion of the basin is divided by
ge of heights, which is connected with the Takt-
s northern extremity, but runs in the opposite
rom west to east, being at its western end united
man mountains. Its eastern extremity does not
indoo-coosh, as it is separated from this great
ow depression, through which the drainage of the
stricts is carried by the river Ghorbund to the Ka-
These northern districts go by the name of Koh-
n the west they are surrounded by the Pughman
nd on the north and east by the Hindoo-coosh
s offsets. The Koh-Daman has a length of thirty
medium width of seven. The western side of
much higher than the eastern, along which the
the opposite mountain flows. The mountains sur-
are split by numerous ravines, through which rills
st water fall. The slopes enclosing these ravines
planted with the mulberry, and every moderately
planted with fruit-trees or the vine. The south-
the plain is a stony and comparatively barren
incipal produce of which is fruit, for which both
climate are well suited; the northern and larger
ds grain, cotton, tobacco, artificial grasses, and
but scarcely any fruit except the mulberry, of
are many plantations. Here, as in the valley of
hich opens into this plain, the mulberries, when
ound, produce a flour, which is used in making
h-Daman is a favourite country residence of the
abitants of Kabool, and is almost as thickly
h castles as with gardens. They are strongly
ay be compared with the old baronial residences

the Koh-Daman is the *Plain of Logur*, so called
er which traverses its southern portion before it
bool river. It extends about 20 miles from west
half as much in the opposite direction. In the
e is a ridge of higher grounds, which divides the
Kabool above their junction. The ground is so
appears to have been formerly a lake, and at
rge portion of it is a swamp during nearly the
especially along both banks of the Logur river.
least fertile part of the Basin of Kabool, and the
rounds occupy only a small portion of the surface;
y rich in grass, an important object for a nation
so many horses as the Afghans. It contains also
chards and vineyards.
l fruits of the Basin of Kabool constitute the prin-
of trade. They go to Hindustan. Grapes of a
nt kinds are grown, but only two species bear
There are six varieties of apricots; of the mul-
any, besides endless varieties of apples, pears,
lnuts, almonds, quinces, cherries, and plums.
ite melons are raised in abundance. The wild
is used to make preserves. The vegetables are
ut not plentiful. They have cabbage, lettuce,
ts, onions, leeks, cucumbers, gourds, beans, peas,
ry, and cauliflower: these are generally culti-
fields, the gardens being reserved for fruits and
rigation is common wherever water is found.
of Kabool is 6396 feet above the sea-level, and
st eastern part of the basin of Kabool is 6000
; whilst the western rises, in the Mydan valley,
. It has therefore a much colder climate than
pected from its geographical position. It is
mmer than England, but in winter it is much
t even in summer the heat is so moderate as never to be disagreeable in the shade, and no night is so warm that a thick covering can be dispensed with. The winters however are very cold. In that of 1839-40 the thermometer was often 4° and 6° below zero of Fahrenheit. On the 3rd of September the first snow fell. The snow generally covers the ground for three months at least; but after the vernal equinox it disappears from the higher places. At this season of the year there are copious falls of rain, sleet, and snow. The changes in the temperature are greater than in England, even in the warmest season. The range of the thermometer in August (1839) was from 46° to 74° at four o'clock in the morning, and at three in the afternoon from 72° to 96°; in September, in the morning from 50° to 64°, and in the afternoon from 70° to 90°; in the first half of October, in the morning from 30° to 56°, and in the afternoon from 64° to 92°. The quantity of snow which falls is very considerable, and is justly considered one of the principal reasons of the vigorous vegetation in the hot and dry season. There is a favourite proverb in Kabool: 'Let Kabool be filled with snow rather than gold.' In spring the rains are rather abundant, especially in April. In May they are rare, and when heavy do great damage to the fruits. In the following months only light showers are experienced.

Between the Basin of Kabool and that of Jellalabad is *the mountain-region of the Lattabund Pass*. It occupies about 30 miles in extent, and is filled by numerous offsets from the southern range of mountains, which approach to the banks of the Kabool river, and between them are several narrow valleys. The whole is a succession of steep ascents and descents, and the ridges frequently rise 1000 or 1500 feet above their base, and are broken into crags and precipices. Both mountains and valleys are of the most barren description; they present no sign of vegetation, except in the immediate vicinity of the Kabool river, where some stunted trees are met with, but not a blade of grass. This tract is almost uninhabited. The few families here are wretchedly poor, and live in caves.

East of the mountain-region of Lattabund is the *Basin of Jellalabad*, which extends about 40 miles from west to east, and has an average width of about 10 miles. The surface is in general much diversified by ascents and descents of moderate elevation. Along the Kabool river is a tract varying between one mile and one mile and a half in width, which is level, and low, fertile, and well cultivated. Fine meadows alternate with groves of fruit-trees and fields, on which the sugar-cane, rice, jowary, and maize are grown to a great extent. Villages and mud castles are very numerous. But at the back of this fertile strip the country is a stony desert, overspread with numerous low and bare hills, which gradually rise higher as they approach the high masses of the Sufaid-Koh. In the vicinity of these mountains the country improves, and contains numerous villages surrounded by orchards, and between the villages a considerable portion of the surface is under cultivation. The soil of the middle tract is very stony or sandy. Towards the eastern extremity is a tract covered with an efflorescence of soda. As the level of this plain varies in elevation above the sea between 1400 and 3000 feet, the climate is much warmer than in the Basin of Kabool. Towards the eastern extremity is a barren stony desert surrounded with low hills, where, in the months of April and May, a pestilential wind or *simoom* prevails, which sometimes proves fatal to the traveller.

The *mountain-region of Kyber* sends its offsets to the banks of the Kabool river, east of the Basin of Jellalabad. It occupies 20 miles along the river, which is about 20 miles distant from the main range. This tract also is covered with numerous ridges, which grow lower as they approach the river. Narrow passes, with numerous ascents and descents, lead over them; one of them is the famous Kyber Pass, whose summit is 3373 feet above the sea, nearly 1400 feet above Jellalabad, and 2300 feet above Peshawur. It is from 18 to 20 miles long in a straight line, and about 30 miles by the road. The hills along this road, and between it and the river, are precipitous, and only covered with bushes; but towards the main ridge there are several smaller table-lands which are tolerably level, and, being partly irrigated, yield tolerably good crops of grain. There are also extensive orchards, and groves of poplar and willows.

The *Plain of Peshawur* extends from west to east about 60 miles, with a width varying from 30 to 40 miles. The surface is not level, but presents only long and gentle slopes, in some places broken by ravines. The greater part of it has a clayey or loamy soil, which in some places is of great depth. It requires much watering and much stirring, but when properly treated it bears very heavy crops. The soil of those tracts which lie in the immediate vicinity of the river, and that of the island of the Daoodzyes, contains a considerable quantity of alluvial earth mixed up with clay, but it is inferior in fertility to most other parts of the plain. Towards the mountains, which surround it on the south like a semicircle, the country is stony, and in some parts also sandy, and of indifferent fertility. The orchards that are scattered over the plain contain abundance of plum, peach, pear, quince, and pomegranate trees, and the greater part of the plain is in the highest state of cultivation, being irrigated by many watercourses and artificial canals. Thirty-two villages have been counted within a circuit of four miles. This shows that the inhabitants are wealthy and industrious. The principal cultivated grains are rice, maize, wheat, and barley. During the summer the heat is very great, and at the solstice almost insupportable. It moderates however in the month of July, when either showers of rain fall or the air is cooled by winds from the east, in which quarter the rains have commenced. Sometimes a fall of snow occurs, but it melts instantly. Frost however is very frequently experienced in every season. The rains which are carried to Hindustan by the south-west monsoon reach Peshawur, but they do not last more than about four weeks in July, nor are they abundant: in some seasons they fail entirely. But the winter rains are plentiful, and more so in the second than in the first half of winter. The rains in spring are much more abundant, and they are heavier at that time than in any part of Hindustan, Cashmere excepted. This large plain is more than 5000 feet lower than that of Kabool, the town of Peshawur being only 1068 feet above the sea.

The plain of Peshawur does not extend to the Indus. From both the southern and northern mountains a ridge runs out which skirts the river at the distance of a few miles; between them the Kabool river flows in a narrow gorge, which is not traversed by any road. But at no great distance from its banks on the south is a depression in the ridge, which forms a defile, called Geedur Gulla (or the Jackal's Pass), which is about two miles long, and leads to the bridge over the Indus opposite to Attock.

III. *The Suliman Range and Eastern Declivity of the Table-land.*—What are called the Suliman Mountains is nothing but the elevated crest of the eastern declivity of the table-land itself. The level of the Indus is seldom more than 500 feet above the sea-level, but the level of the crest of the table-land varies from 5000 to 7000 feet. When seen from the banks it appears like a very elevated mountain-range, though it hardly rises a few hundred feet above the general level of that portion of the table-land which is contiguous to it on the west.

The *Suliman Mountains* are closely connected with the snow-capped mass of the Sufaid-Koh, which must be considered its most elevated summit. They extend thence southward, keeping always in the vicinity of 70° E. long. until they reach 29° N. lat., where they may be said to terminate, nearly due west of the confluence of the Indus with the Garra. A little north of 29° N. lat. the crest of the table-land turns suddenly to the west, and continues in that direction between 70° and 68° E. long., when it meets the Hala mountains of Beloochistan. That portion of the crest which lies from east and west, is called the Muree and Boogtee mountains. There are very few summits which rise above the general level of the Suliman mountains, and none of them attain the snow-line. The most elevated has given its name to the whole range. It is the Takt-i-Suliman, which lies near 31° 30′ N. lat., and rises, according to Lieut. Wood, to nearly 11,000 feet above the sea. That portion of the range which lies north of the Takt-i-Suliman constitutes a continuous chain, with the exception of one break, not far north of the Takt-i-Suliman, through which the Gomul river, which rises far in the interior of the table-land, descends to the Indus. The space which lies between the Suliman mountains and the river Indus is occupied by the declivity of the table-land. The river however does not run parallel with the range; at the northern extremity the distance between them exceeds 100 miles, but it is less farther south. South of 32° N. lat. it falls short of 50 miles.

One of the most remarkable features of the northern portion of the declivity is the *Salt Range*, which is broken by the Indus river near 33° N. lat., nearly at a right angle, and extends from its western bank west-north-west to the Suliman mountains, which it reaches a few miles south of the Sufaid-Koh. It is composed of sandstone, containing ve
extensive layers of rock-salt, which are largely
the town of Kalabagh, just on the banks of the In
it is exported to different parts of Hindustan and
tries. The Salt range does not appear to ris
2000 feet above the banks of the Indus; but i
higher farther to the west. The rivulets and
brackish, and the land very poor. A few flocks
goats are kept. The cultivated land is scattere
there in small patches. It requires patient labou
tinuance of favourable weather to raise the coar
grain.

Between the Salt range and Kyber mountains
land called Bungash, which is from 500 to 70
the level of the Indus; for this is the elevatio
cipitous rocks which here form its western bank
face of this table-land is traversed by several r
from 500 to 1000 feet above their base; they
with soil, but of indifferent fertility. The depr
ever between them, especially those near the riv
great productive powers, as the soil rests on limes
are almost entirely covered with well-cultivated
fuly enclosed and abundantly irrigated by the
Toe or other perennial streams, which receive
from the Sufaid Koh or its neighbourhood.

The country south of the Salt range is drained
Kooram, which also rises in some of the south
the Sufaid-Koh. The country along its bank
descend gradually to the Indus, until it terminat
of considerable extent called Bunnoo. The hi
the valley bears the name of Bungash-i-Bala, or
gash. The soil of this region consists of cla
sand, and possesses a considerable degree of fertili
where the crops do not depend on the rain, but
from the river or its affluents. The whole, b
Bunnoo, is well cultivated and populous. The p
are barley, rice, maize, and wheat. The sugar
grown to a great extent. Rice and sugar a
Turmeric is cultivated in Bunnoo: it is of the
and its exportation is considerable. The villages a
but small: except along the mountains which
region, no domestic animals are kept but thos
used in cultivation, cattle and buffaloes.

That part of the declivity of the Suliman mou
lies south of the Kooram river goes by the nam
Here the nature of the country is changed. It
scend by an inclined plain, but by terraces, each
enclosed by two ridges running south and nort
places there are three, in others four such terrac
the ridges are overgrown with forest-trees; in
are only covered with shrubs and bushes, but co
ground. Some of the valleys between the ridge
and can only be used as pasture for camels, goats
but the larger number of them have a good clay
mixed with sand, especially in the neighbou
Indus; their fertility is considerable. Wheat
several of the grains of Hindustan, as jowary, b
cultivated to a great extent. Considerable
cotton are raised and exported. There is little
dates. Cattle are the chief stock, but sheep are al
both of the heavy-tailed and light-tailed speci
the valleys is inhabited by a different tribe; so
tribes live in one valley. Their villages are n
frequently large; the head towns of the tribes
2000 to 4000 houses, with bazars and numero
which most of the Indian goods are sold by
families settled in these places.

Our knowledge respecting that portion of
which lies south of the Gomul river is inco
appears that here also it consists of terraces
above the other, and that there are valleys
ridges; but we know nothing of these valley
inhabitants. This declivity however does not de
banks of the Indus; it is separated from them
level tract from 15 to 20 miles wide. The soil
stiff and hard clay of an ashy colour, which is
to be cultivated. Towards the river however it i
a portion of sand, which has been introduced b
and has improved its quality. Near the base of t
the soil is partly covered with stones or sand, or
have been washed down by the rains. At
extremity of this region, north of Mittun-kot,
desert of some extent called Dajel; the hardnes

where they pass the winter season under one roof with their cows and sheep, using as fuel small dry shrubs and the dung of their cattle. In summer they live with their animals on the slopes of the mountains. Near their villages they cultivate small fields, where they raise barley, and, when the elevation is not too high, wheat. The Eimack lead a more nomadic life, and reside the whole year round in tents made of dry sticks or felt, and go with their flocks in summer to the more elevated and in winter to the lower declivities of their mountains. They exact a tribute from all travellers who pass through their country. Both tribes are nominally dependent on the sovereign of Kabool; but they are governed by their own hereditary chiefs, who exercise despotic authority. These chiefs live in mud forts with a kind of state. Each tribe is divided into many divisions, each of which is independent of its nearest neighbour; and they have frequent feuds with one another, in which many young persons are taken prisoners and sold as slaves in Turkistan. They are visited by traders from Herat, Kandahar, and Kabool, who furnish them with some common articles of dress and utensils, and receive in return slaves, cattle, clarified butter, woollen cloth, grain sacks and carpet bags, felts for horse-clothing, and carpets, all made from the produce of their flocks. They also furnish lead and sulphur.

That portion of the population on the table-land which is occupied with agricultural pursuits is known by the name of Tajiks or Tadjiks. They are found in all the countries of Western Asia, from the Mediterranean to Chinese Turkistan; and even in the last-mentioned country many families of Tajiks are settled. In a few mountainous countries they have maintained their independence; in all others they are subject to the nations which have conquered them, and which have preserved their pastoral habits. Their condition may be compared to that of the serfs of the middle ages in Europe. They are the glebae adscripti, who work the cultivated grounds, and are obliged to give up to their masters one-fourth or one-half of their produce. They are peaceful, industrious peasants, more civilized, intelligent, and skilful than their masters. In the towns they constitute the labouring classes; they are tradesmen, mechanics, and labourers. They generally wear the dress and follow the customs of their rulers. They have preserved their language, which is however mixed with many terms derived from the language of the predominant nation. Their language is learned by all the Afghans who wish to be considered as men of education.

In the Plain of Peshawur and the neighbouring districts many Hindkees, as they are called, are settled as agriculturists. Their language is a kind of Hindustanee, resembling the dialect of the Panjab. The number of Hindus settled in Afghanistan is very great: there is scarcely a village of any extent without a family or two, and in the larger places there are many. They keep shops; are brokers, merchants, bankers, goldsmiths, sellers of grain, and other occupations. They retain the Hindu features, and some of them have nearly the Hindustanee dress. They are much employed by the great men of the country in every kind of business connected with money or accounts.

The Kuzzilbashes are only found in towns, except about Herat, where they are also settled in villages. A great number of them are in Kabool, where they were settled by Shah Nadir and Ahmed Khan. They are Turkomans, and their ancestors were members of some of the *ilats* which wander about in the plains of Persia. They are mostly soldiers, or employed by men of rank as secretaries, masters of the household, and stewards. Some of them have acquired landed property, which they let out to Afghans or Tajik tenants. They are lively, ingenious, elegant, and refined, but false, designing, cruel, and rapacious.

Arabs are settled in Kabool and Jellalabad. They are agriculturists, and do not mix much with the other inhabitants; they have lost their original language. According to Elphinstone, the number of their families amounts to about 2000. Armenians are settled in different towns as merchants. Abyssinians are imported into Afghanistan, as well as into Hindustan, as slaves, and generally form a part of the king's guards. There are also Calmucks in the king's guards; but some families of that nation are settled near Herat as agriculturists.

The population is very unequally distributed over the country. The most populous parts are the valley of the Kabool river, the country south of the Sufaid-Koh and of the Salt range, the central table-land north of Kelat-i-Giljies, and the immediate neighbourhood of the towns of Kandahar
and of Herat. In all the other parts the populat
as the inhabitants lead chiefly a nomadic life, wi
tion of the fertile tract round Lake Hamoon, wh
considerable agricultural population.

A very clear and interesting account of th
given by Wilken in the Transactions of the Scie
of Berlin, 1818-19, in which he compares the c
the tribes of the antient Persians, as exhibited
and Xenophon, with those of the modern Afgha
out many striking resemblances between them, w
in a curious manner several of the events and tr
the time of the first Cyrus.

Manufactures.—Manufactures which suppl
export are only produced at Herat and Kand
of Herat are silk and woollen stuffs and sword
these articles find a ready sale in Persia. The
of Kandahar are of the same description, with t
fire-arms. Though the articles for exportation a
comparatively small quantities, it appears that
tures of the country are sufficient for the home
as no manufactured articles are imported from
cotton stuffs. As a knowledge of the manufac
conveys an idea of a nation's civilization and of
which it enjoys, we transcribe from Elphinston
following list of the trades exercised in the t
dahar:—Jewellers, gold and silver smiths, book
binders, stationers, makers of kullumdauns (a so
and pencase, of which every man who can wr
seal engravers, sellers of armour, sellers of s
shields are of buffalo's or rhinoceros's hide)
sword-cutlers, polishers of steel, sellers of bow
sellers of glass ornaments for women, three d
shoemakers, bootmakers, button-makers, silk
gold wire and gold thread sellers, saddlers, farr
fruiterers, cooks, soup-sellers, tobacconists, dr
fumers, sellers of sherbet and of fullodeh,
embroiderers, and people whose business is to s
on clothes of all descriptions, from jewels to sp
inhabitants of the Eimack and Hazarah mou
export the wool of their numerous flocks of sh
state, but manufacture it into several kinds of c
grain-bags, saddle-bags, rugs, felt, felt cloaks, n
and horse-cloths. The felt cloaks are called k
extensively used in Kandahar, where they are u

Commerce.—As Afghanistan has no navigab
transport of merchandise is expensive, and t
increased by the want of roads, which are not
all Western Asia from the Indus to the Straits
nople. The conveyance of merchandise is ther
by beasts of burden. Camels are mostly used
countries, and mules or asses in the mountai
Nearly all the land commerce existing between
side, and Persia, Turkistan, and China on th
must be carried through Afghanistan. If w
difficult and dangerous road which leads from L
to Yerkand in Chinese Turkistan, no line of c
exists between India and the above-mention
except the three lines which traverse Afgha
most northern of these lines begins on the fr
British Possessions at Ludiana on the Sutlege, p
Lahore, and reaches the Indus at Attock. H
through Peshawur to Kabool, where it divid
roads. One road runs over one of the elevat
passes of the Hindoo-coosh range or the Pug
tains and descends to the plains of Turan, leadi
and Khulum, and thence to Bokhara. The ot
from Kabool south-south-west to Kandahar, at
all three lines meet.

The middle line of commercial communication
Lahore direct west, crosses the Indus at Dera Ism
ascends the Gomul Pass, which is also called the
and which leads across the eastern table-land
reaches the central table-land it divides into
which one runs northward to Ghuznee and Ka
other to the south-west to Kandahar.

The third road connects the Indian Ocean wi
land. It begins at the seaport of Kurachee,
west of the most western mouth of the Indus, an
along the banks of the river to Shikarpoor, v
verges to the north-west, and passing through D
Gundava, ascends the table-land by the Pa
From this place it continues through Quettah ov
Pass to Kandahar.

number of topes is in the plain of Jellalabad, particularly on both sides of the river Surkhrud; but they are also in other places, and on the northern side of the Kabool river. Others are found in the neighbourhood of Kabool. A few single topes occur in the Koh Daman, and a small group has been found at Wardeh, near the river Logur, before it enters the plain of Kabool.

All the topes, which are in a tolerable state of preservation, consist of two parts, a basement and a perpendicular body resting on it. This construction always terminates above in the form of a cupola, which is sometimes so depressed as to exhibit merely a convexity, but it generally approaches to the form of a cone. These edifices are substantially constructed of layers of large stones connected with well prepared and beaten earth. They vary greatly in dimensions, some of them having a circumference of 144 feet, and many of only 108 feet. The front, as it appears, is directed to the east, for all of them have flights of steps on that side; and some also on other sides. They are situated on the skirts of hills or elevations separated from each other by ravines, and in their vicinity there are always many caves, which apparently have been used as dwellings; they are supposed to have been the abodes of priests. Near them there are also always one or more tumuli, but there are tumuli where no topes are found; and in general such tumuli abound all over Afghanistan.

Most of the topes contain passages or tunnels extending from the centre to the circumference, and the centre is occupied by a small apartment. In these apartments or their recesses are found caskets or vases of copper or steatite. These vases are sometimes of a globular and sometimes of a cylindrical form, and usually contain smaller cylindrical cases of gold or silver, often of both. These vessels are often separate, but often also are one within the other. One of these smaller vessels generally contains a fragment or two of bone, and these appear to have been the relics over which the monuments have been raised. The whole is carefully wrapped up in an envelope of fine linen. The larger vases usually contain a portion of fine pulverized earth or of ashes; in which are found burnt pearls, beads, rings, seals, and other trinkets, with gems, coloured stones, pieces of crystal, fragments of mother-of-pearl shells, &c. In some the deposits have been accompanied by twists of tuz-leaves (probably the inner bark of birch), inscribed internally with characters, but they crumble away when they are handled. Some vases contain minute gold and silver cups, beads of pearls, of crystal, agate or coral, and small ornaments of gold and stones, and some coins.

The prevailing opinion respecting these extraordinary buildings is, that they were erected for the preservation of the relics of Buddha, and that this country was once peopled by nations which had embraced Buddhism. This opinion is supported by the accounts of two Chinese pilgrims, one of whom, Fa Hian, visited the Holy Land of Hianthu, *i. e.* Hindustan, about the year 400 A.D., and the other, Hiuan Thsang, about 630 or 650. Both of them state that a hundred years after the death of Buddha, or about a thousand years before the Christian æra, his adherents began to settle in this part of Afghanistan and to build their towers or stupas, and at the time of their travels they found numerous monuments of this description along the road.

Another kind of antiquities are the coins. Single coins have been found at several places. But they occur in great numbers in the Plain of Beghram, situated in the Koh Daman, where the rivers which drain that valley unite and take their course to the south-east towards the Kabool river. The plain contains about 24 square miles, and, except some slight ridges, the rubbish apparently of dilapidated buildings, it is a perfect level, on which rain stagnates as it falls. Mr. Masson employed several years to gather the coins found in this plain, and in 1837 he succeeded in collecting 60,000 copper coins, besides a number of silver and gold coins, a large number of engraved seals, some of them with inscriptions, figures of men and animals, particularly of birds, cylinders, parallelogramic amulets with sculptured sides, rings, and a multitude of other trinkets, generally of brass or copper. When Lieut. Wood in the following year visited the plain, some children were sent in search of coins, and in a few hours they returned with 35 copper pieces. It is further stated that from time out of memory coins have been collected on this plain, which have been sent to Kabool to be melted down, and that in some years as many as 30,000 pieces have been carried off. We are at a loss to explain in what manner or for what purpose such a number of coins have been heaped up at this place. Some
think that it is the site of one of Alexander's f
of Alexandria near Caucasus, and that it has
time a very large town and the metropolis of
But in that case extensive ruins would exist,
would be covered with small and low eminen
few of such eminences occur, and it is far fr
that they are the remains of buildings. But i
that the Plain of Beghram was the site of a l
would suppose that all the coins found there n
comparatively short period. But the coins c
Masson embrace a period of more than 1250 y
being coined 256 years before the birth of
last about a thousand years after it. If the
left there by the destruction of a town, the m
would be most abundant, and those made in
rare in proportion to the time which had el
destruction took place; but that is not the
2000 of them were struck during the reigns
kings Menander and Apollodotus, between 12

The coins found on the Plain of Beghra
historical documents. They throw light on
which the history of Turan and of Afghanis
between the time when these countries wer
Alexander and governed by his successors, ar
tion of the Mohammedan religion, or from al
Christ to about 1000 of our æra.

History.—Afghanistan was known to the
the name of Ariana [ARIANA, P. C.], which
extended also over those parts of Persia whi
northern table-land of Iran, from Herat to
It formed a part of the old Persian empire,
downfall, with the other provinces of Pe
dominion of Alexander the Great. After t
wars between Alexander's successors had been
that this country, with Bactria, which was nort
prehended the countries on both sides of th
part of the widely extended kingdom of S
Seleucus Nicator. It remained under the Syr
256 or 255, when Bactria, including the easter
declared its independence under Theodotu
Before any attempt could be made by the
recover their dominion over these countries,
western portion of Ariana, revolted under Ars
means to strengthen himself so much, that th
were unable to recover these countries.
placed between the kingdom of Bactria and t
vinces of the Syrian monarchy, the Bactrian
frequently into collision with the Syrians an
of Western Asia, and accordingly mention is
this kingdom in the antient writers. It was
at what epoch Bactria had ceased to be go
of Greek extraction; but the numerous coi
last twenty-five years have been collected in
ghanistan, and Bokhara, have in some mann
deficiency in our historical knowledge. U
BACTRIA, P. C., a list of the Greek kings of
given according to Bayer and Schlegel, but
lication of that article the number of coins
history of that country has been greatly inc
old lists are incomplete. The following list
kings of Bactria have been made out by P
and by Mr. H. T. Prinsep, the brother of the
Prinsep.

B.C.	WILSON.	B.C.	P
256	Theodotus I.	256	Thec
240	Theodotus II.	240	Theo
220	Euthydemus.	220	Euth
190	Demetrius.	190	Dem
181	Eukratides.	178	Eukr
147	Heliokles.	155	Heli
147	Lysias.	150	Anti
135	Amyntas.	190	Agat
	Agathoclea.	195	Pant
140	Antimachus.	155	Men
130	Philoxenus.	135	Apol
135	Antialkides.		Dion
125	Archebius.		Zoil
126	Menander.		Hipp
110	Apollodotus.		Strat
100	Diomedes.		Dior
98	Hermaeus.		Nici
135	Agathocles.	120	Her
120	Pantaleon.		

Veis, his son Meer Mahmood took the power into his hands, assembled a large army, and invaded Persia (1716). Not meeting with any resistance, he advanced to Ispahan, and besieged it in 1722. After a siege of several months, in which the inhabitants suffered all the horrors of famine, Ispahan was forced to capitulate. Sultan Shah Hussein resigned his crown to the conqueror, and with Meer Mahmood an Afghan family ascended the throne of Persia. Mahmood soon afterwards became mad, and died in 1725. His cousin Meer Ashruf took his place. But the whole of the Persian empire had not been occupied by the Afghans. The provinces surrounding the Caspian Sea on the south and west were still in possession of Thamasp, a son of Shah Hussein, who however was already reduced to great straits, when Nadir Koolly, better known as Shah Nadir, entered into his service. He vanquished Meer Ashruf in two battles in 1729, and entered Ispahan. Ashruf lost a third battle near Persepolis in 1730, and was soon afterwards slain. Shah Nadir then conquered Kandahar and the rest of Afghanistan, and, invading Hindustan in 1739, he took Delhi, but contented himself with the immense booty he got there, and turned his arms against the Uzbecks in Bokhara and Khiva, and the Turks. In 1747 he was murdered in his tent, and one of his generals, Ahmed Khan, became the founder of the Duranee dynasty.

Directly after the assassination of Shah Nadir, Ahmed Khan, accompanied by 2000 or 3000 horse, repaired to Kandahar, where he found a great sum of money sent from Hindustan as a tribute to Shah Nadir, and by seizing it he found himself enabled to gain the goodwill of his countrymen, the Afghans, of whom the Duranees, Beloochees, and the Hazaras assisted at his coronation as king of Afghanistan: the Giljies kept aloof. Having settled the country and assembled an army, he began a course of conquest, which only terminated shortly before his death. In 1748 he reduced the Giljies to obedience, and made himself master of the valley of the Kabool river, whence he invaded the Panjab, defeated the army sent against him, and entered Lahore. He then passed the Sutlege river, and defeated another army at Sirhind, but did not follow up this advantage, but returned to Kandahar. In the following year he established his authority in Herat and Meshed; in 1750 he took Nishapoor, and in 1751 he advanced even to Asterabad. In 1752 Ahmed Khan retook the Panjab, which had revolted, and added to it Cashmere. By a treaty with the Great Mogul he acquired all the countries of the Panjab and as far east as Sirhind. But in 1756, when the emperor of Delhi had again taken possession of the Panjab, and annexed it to his empire, Ahmed Khan entered Delhi with his army. The emperor was obliged to leave the Panjab and Sinde in his hands. The Mogul government had become so distracted that all its neighbours attacked it, with the certain prospect of reaping considerable advantages from their expeditions. The Mahrattas especially turned these circumstances to account. They for some time had made rapid progress, and in 1757 they took Sirhind and obtained possession of that part of the Panjab which lies east of the river Jheelum or Jilun. Ahmed Khan retook them in 1759, and entered Delhi, which however was besieged by the Mahrattas and retaken in the same year. The power of the Mahrattas had now attained such a height that all the Mohammedan princes of Hindustan began to fear that their supremacy was drawing to an end, and that they soon would be expelled from the country. This seems also to have been the object of the Mahrattas, to judge from the great preparation that they made for the campaign of 1760. The Indian princes therefore called Ahmed Khan to their assistance. He came, and the famous battle of Paniput (7th of January, 1761) put an end to the supremacy of the Mahrattas. Ahmed Khan could now have ascended the throne of Delhi, but he contented himself with the possession of the countries which had formerly been ceded to him, and returned to Kabool. None of the numerous victories which the British have obtained in Hindustan has more facilitated their conquests in that country than the battle of Paniput, in which they were not present. For the only power which was able to make a strong resistance to foreign conquerors had been broken down, and Ahmed Khan left, by his returning to Afghanistan, the government of all the Mohammedan princes in the most disjointed state. In the latter part of his life Ahmed Khan was almost continually contending with the Sikhs, who were settled in the mountains north of the Panjab, and they made several attempts to get possession of the plains drained by the Five Rivers. Ahmed Khan always succeeded in driving them back into the mountains, but the possession of the Panjab remained a precarious tenure. Ahmed Khan died in 1773, and to his praise it must be recorded that the memory of no Eastern prince is stained with fewer acts of cruelty and injustice. The empire which he had erected extended from Herat on the west to Sirhind on the east, and from the banks of the Oxus and Cashmere on the north to the Arabian Sea and the mouths of the Indus on the south. It may appear a matter of surprise how such an extensive empire could fall to pieces in such a short time as has elapsed since the death of Ahmed Khan. This may be accounted for by the peculiar organizatio of this as well as so many other extensive empires of Western Asia, which have had the same fate. Some of the conquered countries were left in possession of their native princes, who were only obliged to pay a tribute, as Beloochistan and Sinde. To others governors were sent with absolute power, as to Cashmere. Whenever the possessors of these countries perceived that their sovereign was unable to compel the tribute, they refused to pay it. The authority of the Afghan sovereigns in their own countries also was not great, as it was dependent on the good will of the chiefs of the differen tribes, who frequently paid no attention to the orders o their master, and whom he was not always ready to compe to do their duty. It is evident that such an empire can only be kept together by a sovereign who is always at the hea of a sufficient army, and always marching from one end of hi country to the other, as Ahmed Khan really did. A sovereign gifted with a less active or restless mind soon found tha his authority decreased. This happened to Timur Shah, th son and successor of Ahmed Khan. He removed the seat o government from Kandahar to Kabool, and seems to have mad some attempts to establish a more settled administration, bu he was almost always engaged in putting down the rebellion which broke out in the different provinces of his empire. I 1781 he was obliged to march into the Panjab to recove Mooltan, which had been betrayed into the hands of the Sikh by the governor. He died in 1793. At his death the secon of his sons, Shah Zeman, was raised to the throne by an intrigue. He had to put down several insurrections and rebellions, but the affairs of the Panjab and of Herat chiefl occupied his time and attention. The Sikhs had got possession of the Panjab, and in 1798 he advanced without molestation to Lahore, when Runjeet Singh submitted, did homag in person, and was installed by him as governor of the province Shah Zeman did not dare to remain long in the Panjab as his step-brother Mahmood, who was governor of Herat and acted as an independent sovereign, was always ready t march to Kandahar to get possession of that town, and Zema was unable to reduce Herat. In 1799 several great me entered into a conspiracy for the purpose of deposing Zema and raising his brother Shoojah on the throne. The conspiracy was discovered and the conspirators were beheaded among them Sirafrauz Khan, the powerful head of the Barukzyes, one of the principal clans of the Duranees. Thi estranged Futeh Khan, the son of Sirafrauz Khan, from his interests, and this warrior joined the party of Mahmood of Herat By his assistance Mahmood got possession of Kandahar, an soon afterwards Shah Zeman fell into his hands, and was deprived of sight. Mahmood took possession of the throne i 1800. His reign lasted only three years. Prince Shoojah ool-Moolk, the brother of the deposed king, made three attempts to drive Mahmood from the throne, but they wer frustrated by the activity and valour of Futeh Khan. Th powerful tribe of the Giljies, which had given kings to Persi and emperors to Hindustan, tried in 1801 and 1802 to raise on of their chiefs to the throne, instead of a Duranee, but the were defeated. Mahmood however was unable to give even slight degree of stability to his government, and permitted th inhabitants of the towns and in general the agricultural population to be plundered and oppressed by an undisciplined soldiery. An insurrection took place in the town of Kabool Prince Shoojah, being informed of it, advanced with an army and found that the king was besieged in the Bala Hissar, o citadel of Kabool, which was closely invested by the populace Futeh Khan advanced with an army to his relief, but Princ Shoojah succeeded in defeating him, and Mahmood was sen to prison.

Shah Shoojah occupied Kandahar, and, having settled th western provinces of his kingdom, gathered a strong army an began the wandering life of an Afghan sovereign. He marche to Sinde, which submitted and paid the tribute in arrear, an then returned by Peshawur to Kabool. Meanwhile Fute Khan had tried to put Kamran, the son of Mahmood, wh was governor of Herat, and acted as an independent prince in possession of Kandahar, but he did not succeed. The Shah sent an army to Cashmere, the only province in rebellion, in 1805, and it was subdued in 1806. But at the same time Prince Kyser, a son of Shah Zeman, had been induced to rebel by Futeh Khan, and had been proclaimed king of Kabool, but was beaten, and submitted in 1808. During this civil war Mahmood had been liberated, and had taken Kandahar. Shoojah marched against and defeated him. Cashmere had again rebelled, and the vizier of Shoojah, Akram Khan, was defeated and lost nearly the whole army. This event threw the affairs of Shah Shoojah into great disorder. Mahmood captured Kabool, whilst the Shah was at Peshawur. In the following year (1809) Shoojah marched to Kabool, but his vizier, Akram Khan, was beaten and killed. The Shah, abandoned by all, became a fugitive, and was soon led as a captive to Cashmere.

Shah Mahmood again ascended the throne in 1809. He sent his army in 1811 to Cashmere, and was supported by a force of Sikhs which Runjeet Singh sent to his assistance. Cashmere was obliged to submit, and Shah Shoojah was set at liberty and went to Lahore. Runjeet Singh acquired the fortress of Attock, and since that event the power of the Afghans has ceased on the eastern side of the Indus. In 1815 the Persians were about to attack Herat. Futeh Khan, the vizier of Mahmood, marched against them and defeated their army, but made himself master of the place, dismissing the governor, a brother of Shah Mahmood. In 1816 Futeh Khan was deprived of his sight by Kamran, the son of Shah Mahmood, and soon afterwards murdered. The consequence of this wanton and cruel act was a civil war between the powerful brothers of Futeh Khan and Shah Mahmood, by which the reigning family in progress of time was deprived of all its territories except Herat. Several princes of the royal family were raised to the throne, but soon lost it by another revolution, and then several members of the family of Futeh Khan occupied it for a short time, until at last the country was divided among them in 1824. Dost Mahomed Khan, one of the brothers, succeeded in appropriating to himself the valley of the Kabool river and the adjacent districts in 1826. Shah Mahmood died in 1829 at Herat, and was succeeded in that sovereignty by his son Kamram. During these troubles Runjeet Singh had made himself master of Cashmere and kept it. One of the brothers of Futeh Khan had been put in possession of the plain of Peshawur, but Runjeet Singh contrived matters so that Yar Mahomed Khan found himself compelled to pay tribute to the chief of the Sikhs, and at last he deprived him of his territories, and placed Peshawur under the government of the Panjab. If some valleys in the Himalaya Mountains are excepted, it may be said that the power of Maharaja Runjeet Singh was erected at the expense of Afghanistan. As late as the beginning of the reign of Shah Shoojah, the Panjab, Cashmere, with the adjacent countries, and the plain of Peshawur, were considered as appurtenances of Afghanistan, and these provinces constituted in 1832 the empire of the Sikhs. In 1808 Shah Shoojah still received a tribute from the Ameers of Sinde; but they had also become independent during the civil war. Between 1809 and 1839 Shah Shoojah made several attempts to re-conquer Afghanistan, but without effect. At last he retired to Ludiana on the Sutlege in 1835, where he received an annuity from the British government in India. When the British entered Afghanistan three brothers of Dost Mahomed Khan were in possession of Kandahar and the contiguous countries, and Herat was governed by Kamram: all the rest of Afghanistan was subject to Dost Mahomed Khan.

Dost Mahomed resided at Kabool as his capital city, while Runjeet Singh was sovereign of Lahore, and was at the same time in possession of Cashmere and Mooltan. Dost Mahomed, desirous of securing the friendship of the British government, on the 31st of May, 1836, addressed a complimentary letter to Lord Auckland, who arrived at Calcutta towards the end of 1835, as Governor-General of India, and who appears to have soon adopted the notion that the British empire in India was in danger from the intrigues and forces of Russia, Persia, and Afghanistan. On the 20th of September, 1837, Captain Alexander Burnes reached Kabool as envoy from the governor-general. On the 24th of December a Russian agent arrived at Kabool, and Burnes was somewhat confounded to learn that he was honourably received by Dost Mahomed. On the 26th of April, 1838, Captain Burnes left Kabool on his return, and after visiting Runjeet Singh in Lahore, repaired to Simla to meet Lord Auckland. Here it was resolved that, as Dost Mahomed was treacherous, and disposed to enter into alliance with Russia and Persia, and could not be trusted, he should be dethroned, and Shah Shoojah sent with an English army to recover the throne of Kabool. Two months before Captain Burnes met the governor-general at Simla, a treaty had been made by Mr. MacNaghten and others with Runjeet Singh, in which he undertook to prepare the way for an easy advance of the British army through the Sikh country to Kabool. On the 1st of October, 1838, a proclamation of war was issued from Simla against Dost Mahomed. Sir Henry Fane was at that time commander-in-chief of the whole army of India, which was then raised to 203,000 men. Runjeet Singh, notwithstanding the late treaty, refused to allow the British troops to cross the Panjab, and the principal rendezvous was therefore appointed at Shikarpoor in Sinde, whence the line of advance was to be by the Bolan Pass, Quettah, and Kandahar. The force on the Bengal side, 9500 strong, was ready to advance to Sinde at the beginning of December; and a reserve division, 4250 strong, was stationed at Firozepoor, on the banks of the Sutlege, about 50 miles from Lahore. A Bombay column of 5500 men, under Sir John Keane, was to advance through Sinde, the Ameers having promised to provide supplies and the means of conveyance. Shah Shoojah's contingent was 6000 men. As soon as the Bengal division reached Firozepoor, Sir H. Fane resigned the command from ill-health, and Lord Auckland appointed Sir John Keane to the direction of the whole army of advance, Sir Willoughby Cotton, as senior officer, succeeding to the command of the Bengal division till its junction with that of Bombay. Runjeet Singh and the Sikhs having failed to afford the promised assistance, Sir Willoughby Cotton and the Bengal army, with 80,000 camp-followers, on the 20th of February, 1839, began to cross the broad desert towards the Bolan Pass, and reached Dadur, at the foot of the western mountains of Afghanistan, and close to the Bolan Pass, on the 6th of March, when provisions were already so short that the camp-followers were put on half-rations. The pass is 60 miles long, winding, rugged, and flanked by high rocks. The surrounding country is inhabited by the wildest tribes of Afghans, who live almost entirely by plunder. Fortunately little opposition was offered to the troops, and they reached Quettah, in a fertile valley, after losing a vast number of horses and camels owing to the extreme ruggedness and difficulty of the Pass. At Quettah they expected to find supplies, but there were none; and after some useless negotiations with Meerab Khan of Khelat, to whom the place belonged, the army was compelled to push forward, in a state approaching to famine, to Kandahar, distant 150 miles, which they reached on the 26th of April, having marched 1000 miles since they left Firozepoor.

On the 12th of April the Bombay column, after having endured terrible fatigues and privations, entered the Bolan Pass, and, in spite of considerable opposition, passed through it, and joined the Bengal division on the 4th of May. The united army then amounted to 10,400 fighting men. The camp-followers had been greatly reduced, but still amounted to 29,000.

Kandahar contained nearly 100,000 inhabitants. The rulers fled with their families, and the population seemed to give a warm welcome to Shah Shoojah. On the 1st of July the whole army had quitted Kandahar, and was in march for Ghuznee, 230 miles distant, the soldiers being on half-rations and the camp-followers on quarter-rations. On the 21st of July the army encamped under the walls of Ghuznee, which was found to be much more strongly fortified than Sir John Keane had expected. All the gates had been walled up except that opening upon the Kabool road, and it was resolved, as the only means which offered any prospect of success, to blow down this gateway with powder-bags, and attempt to take the town by assault. On the night of the 22nd of July the gate was blown open by 300 pounds of powder in twelve bags; the storming-party immediately rushed in, and, after a long and desperate and doubtful fight with the Afghans, carried the town, and by five o'clock in the morning, or little more than three hours after the gate had been blown open, the strong citadel was also taken, and the British colours waved from its battlements. Hyder Khan, the governor, one of the sons of Dost Mohamed, surrendered in the course of the morning, and was placed under the care of Sir Alexander Burnes, who had been knighted previous to the advance of the army.

On the 30th of July Sir John Keane marched with the main army from Ghuznee to Kabool; and Mahomed Akber Khan, Dost Mahomed's second son, who held Jellalabad, having been hastily recalled to assist in the defence of Kabool, Jellalabad was taken possession of by Colonel Wade, who attacked Akber Khan so vigorously in his retreat that he was compelled to abandon all his artillery, camp equipage, horses, bullocks, and 7000 rounds of ball-cartridge, which fell into the hands of the British.

As Sir John Keane drew near Kabool, Dost Mahomed abandoned his throne and capital, and fled with 600 horsemen to seek a refuge beyond the Oxus. At the same time the death of Runjeet Sing was announced. Sir John Keane and Shah Shoojah encamped under the walls of Kabool on the evening of the 6th of August, and on the following day the Shah, accompanied by the British officers, made his triumphal entry into his former capital; but there was no display of enthusiasm on the part of the natives, whose behaviour was orderly and respectful, but cold and cheerless.

The conquest was now considered to be complete. The Bombay column quitted Kabool on the 18th of September, the Bengal division on the 20th of October; and, leaving 8000 men, British and sepoys, besides the Shah's contingent, to secure him on his throne, the British army returned to India. Sir John Keane returned to England, and was raised to the peerage by the title of Baron Keane of Ghuznee and Cappoquin, with a pension of 2000*l.* a year.

Mr. MacNaghten, having been created Sir William Mac Naghten, was left at Kabool as envoy, and Sir Alexander Burnes as assistant to the envoy. In the spring of 1840 insurrections and attacks upon the British outposts began to break out, which, as summer advanced, assumed a bolder character, and were not kept down without a good deal of severe fighting. Dost Mahomed, having received some assistance, returned to Afghanistan, to stir up the insurrection; but as he advanced towards Kabool, he received such severe losses and was reduced to such extremity by the British troops, that he resolved to surrender to Sir William MacNaghten; and, on the 3rd of November, when Sir William was returning from his evening ride, Dost Mahomed rode up to him, alighted from his horse, and, presenting his sword to the envoy, sought his protection. His sword was returned, and the protection promised. He had ridden sixty miles from the field of the battle of Purwan Durrah, in which he had been defeated on the preceding evening, straight to Kabool, having been twenty-four hours on horseback. On the 12th of November he was sent to India under a strong escort. Mussooree, on the British north-west frontier, was assigned to him as a place of residence, and three lacs of rupees, or about 30,000*l.*, were allotted to him as a revenue.

The insurrections continued. At the end of 1840 the British had 16,000 men in Afghanistan; in November, 1841, they had 14,000, besides the Shah's contingent. In May, 1841, Major Pottinger warned Sir William MacNaghten of the dangerous situation of the British, of the insufficiency of the military force in some places, and the badness of the cantonments in nearly all. He was disregarded both by Mac Naghten and Burnes. By the end of September the neighbourhood of Kabool swarmed with predatory bands, and during the month of October the British officers were treated with insolence and insult in their cantonments at Kabool. On the 2nd of November, 1841, Sir William MacNaghten was in the cantonments, and Sir Alexander Burnes in his house in the city, when, about nine in the morning, Burnes's house was set on fire, and himself, his brother Lieut. Burnes, Lieut. Broadfoot, and every man, woman, and child on the premises murdered. The British officers in the cantonments seemed to be stupified, and did nothing. Major-General Elphinstone at this time held the chief command of the army, but was in such a state of nervous weakness from ill-health as to be utterly incapable of acting with the necessary decision and energy in such an emergency. The insurrections continued to increase; the British officers became more confused and indecisive; Sir William MacNaghten was murdered on the 23rd of December, in the presence of Akber Khan, who had invited him to a conference; and by a council of war held on the 26th of December, a treaty was ratified, by which it was agreed to leave behind all the guns except six, to relinquish all the treasure, to give up four officers as hostages, and to pay 40,000 rupees, in bills drawn upon India, but negotiated on the spot by some Hindu bankers, for which the whole army was to be escorted to Peshawur; but ultimately Akber Khan undertook to conduct it in safety to Jellalabad.

On the 6th of January, 1842, the bills having been drawn, and hostages given up, the army left its cantonments at Kabool, and began its retreat, one of the most disgraceful to the British army as well as the most disastrous that has ever bee recorded. The whole force was estimated at about 450 fighting men and about 12,000 men of camp-followers, besid women and children.

The work of massacre began immediately; on the 8 of January, Major Pottinger and Captains Lawrence Mackenzie were given over to Akber Khan, as hosta for the evacuation of Jellalabad by General Sale; and army entered the Khoord Kabool Pass, five miles lo shut in on either hand by a line of lofty hills, with a tor dashing down the centre, whose course the frost in attempted to arrest. The destruction of life in this pass very great. Lady Sale received a ball in her arm, and L Sturt, her son-in-law, was mortally wounded. On the the married officers, with their wives and children, and other wounded officers, were given up to Akber Khan. the 10th the army made its way through the Tunghee Tar or Dark Pass, only fifty yards long, and the Tezeen Pass, miles long, with great loss. On the 11th General Elphin with two other officers, fell into the hands of Akber On the 12th the army reached Jugdulluk, 23 miles Tezeen, and at night entered the Jugdulluk Pass, two long, and exceedingly narrow, precipitous, and difficult. found the exit from the pass closed up by two strong b of prickly holly-oak stretching completely across the On the 13th, when the remnant of the force reache neighbourhood of Gundamuk, where the final struggle place, they had only about twenty muskets left. C Souter and seven or eight men were taken prisoners. Brydon reached Jellalabad. The rest were killed. Du the whole time of the retreat the attacks of the Afghans incessant, the cold was intense, and they were almost enti without food. Including camp-followers, women, and childre about 26,000 individuals were destroyed.

General Sale held Jellalabad, General Nott maintain himself in Kandahar, and Colonel Palmer, with one nati regiment and some artillery, retained Ghuznee, which however was afterwards taken from him, and Palmer and the remains of his army made prisoners. Akber Khan on the 18th of January laid siege to Jellalabad, and though the wretched mud walls as well as the fortifications thrown up by General Sale were shattered by a tremendous earthquake, and many other earthquakes occurred which obliged the soldiers to sleep in their clothes and accoutrements for fear of breaches in the walls and the risk of night attacks, Akber Khan was neither able to take the place nor prevent Sale's foraging-parties from supplying the garrison with the means of subsistence.

Lord Ellenborough succeeded Lord Auckland as Governor-General of India, where he arrived on the 28th of February, 1842, and the courage of the garrison of Jellalabad was kept up by the welcome intelligence that Colonel Wild would attempt to relieve them by forcing his way through the Khyber Pass, and that General Pollock was crossing the Panjab with a fresh army from India. Colonel Wild in vain attempted to get through the Khyber Pass, but General Pollock kept steadily advancing, and though the distance was from 500 to 600 miles, he arrived at Jellalabad on the 16th of April, having beaten the Afghans decisively in the Khyber Pass, and when he reached the fortress the beleaguering army was dispersed and in rapid flight. General Nott, on receiving some supplies in Kandahar, was ready to co-operate with General Pollock and General Sale in an advance upon Kabool. Shah Shoojah had some friends among the Afghan chiefs, and was able to maintain himself in the Bala Hissar, or citadel of Cabul, after the British had left him to his own resources; but he was assassinated by Shoojah Dowlah, and Futty Jung, Shah Shoojah's youngest son, was proclaimed king by one party and opposed by another.

On the 17th of January, the party of prisoners, consisting of 20 officers, 9 ladies, and 14 children, besides 17 European soldiers, 2 European women, and one child, reached the fort of Buddeabad, in the Lughman valley, where they were kept till the 10th of April, when they were marched back to a fort at Tezeen, Lady MacNaghten's baggage having previously been rummaged and plundered of jewels and shawls valued at 15,000*l.* General Elphinstone died in this fort on the 23rd of April, and his body was sent to Jellalabad for interment.

In consequence of the indecision of the Indian government and the deficiency of his supplies, General Pollock was no able to leave Jellalabad before the 20th of August. Meantime, on the 15th of August, General Nott, at the head 7000 men, had left Kandahar for Ghuznee and Kabool. Sultan Jan attempted to stop his march, but sustained a complet defeat; Ghuznee was retaken, and General Nott continued his advance to Kabul.

On the 25th of August, Akber Khan hurried his prisoners off towards Turkistan, under a threat that he would make presents of them all to the chiefs of that wild country. On the 3rd of September they reached Bameean, where they were halted at an old fort till fresh orders were received from Akber. On the 11th of September the khan who had charge of them signed an agreement with five English officers, in which they undertook to give him 20,000 rupees and ensure him 1000 rupees per month for life, on condition that he assisted them to regain their liberty and rejoin their countrymen. The khan now hoisted the flag of defiance on the walls of the old fort, Major Pottinger was appointed commander, and some neighbouring chieftains, knowing that the British armies was drawing near to Kabool, came in and swore on the Koran allegiance to him and his companions.

On the 15th of September, General Pollock, after some hard fighting at the Jugdulluk Pass and elsewhere, having joined his forces with those of General Nott, entered Kabool; and one of his first acts was to send off a party of Kuzzilbashes, adherents of the late Shah Shoojah, to the aid of the prisoners, who on the same day had quitted the fort, resolved to fight their way back to Kabool. At two o'clock in the morning of the 17th of September they were aroused by the arrival of a horseman with a letter from Sir Richmond Shakespear, who was advancing with 600 mounted Kuzzilbashes to meet them. The party resumed their march at an early hour, and at midday reached some deserted forts, where they were sheltering themselves from the sun, when, at three o'clock, Sir Richmond Shakspear and his troop arrived. 'Our gallant countryman,' says one of the party, 'was greeted on our side with no boisterous cheers of triumph. Our joy was too great, too overwhelming for tongue to utter. That we should have escaped unhurt, with so many delicate women, young children, and tender infants, through such numerous perils, fatigues, and privations, and above all from the hands of such merciless enemies as Akber Khan and his Ghilzie confederates, seemed at first too much for the senses to realize.' The march was resumed on the 18th, and on the 20th they were met by General Sale's brigade, the gallant veteran being there in person to regain his long-lost wife and daughter, the widow of the brave Lieut. Sturt. On the 21st of September the happy party marched forward with General Sale's brigade, and entered General Pollock's camp at sunset, amidst the cheers of the soldiers, the congratulations of their friends, and the roar of the artillery, which announced their welcome arrival.

Victory now attended the British standard wherever it was raised, and the Afghan war was at an end. The prisoners had been restored to liberty and their friends, and by a series of well-fought battles the reputation of the British army had been retrieved. On the 1st of October, Lord Ellenborough issued a proclamation from Simla, stating that the disasters in Afghanistan having been avenged upon every scene of past misfortune, the British army would be withdrawn beyond the Sutlege.

On the 12th of October, after having destroyed the fortifications of the Bala Hissar at Kabool, the army began its march back to India, and on the 17th of December, 1842, reached Firozepour, on the Sutlege, where, as Lord Ellenborough expressed it, they were 'within their native boundaries.'

General Sir William Nott died on the 1st of January, 1845, on his estate near Caermarthen, in Wales.

(Ferishta's *History of the Rise of the Mahomedan Power in India*, translated by Briggs; *Memoirs of Zeehir-ed-din Muhammed Baber*, translated by Leyden and Erskine; Hanway's *Revolutions of Persia: The Chronicles of a Traveller*, translated from the Latin of Clodius, by Mitford; Elphinstone's *Account of the Kingdom of Cabul and its Dependencies*; Burnes' *Travels into Bokhara*; Arthur Conolly's *Journey to the North of India, overland from England*; Wood's *Personal Narrative of a Journey to the Source of the River Oxus*; Hough's *Narrative of the March and Operations of the Army of the Indus*; Vigne's *Personal Narrative of a Visit to Ghuzni, Kabul, and Afghanistan*; *Narrative of the Present War of Afghanistan*, by an Officer; Masson's *Narrative of various Journeys in Beloochistan, Afghanistan, and the Panjab*; Wilson's *Ariana Antiqua; a Descriptive Account of the Antiquities and Coins of Afghanistan, with a Memoir on the Buildings of the Topes*, by Masson; Prinsep's *Note on the Historical Results deducible from the recent Discoveries in Afghanistan*; Irwin's *Memoir of the Climate, Soil, Produce, and Husbandry of Afghanistan*, in *Calcutta Asiatic Journal*, Nos. 93, 94, 95, 96, 97; Hutton's *Wool and Woollen Manufactures of Khorassan*, in *Calcutta Asiatic Journal*, No. 99; Edward Conolly's *Notes on the Eusofzye Tribes in Afghanistan*, in *Calcutta Asiatic Journal*, No. 105; Postan's *Memorandum on the Silk Trade between Shikarpore and Khorassan*, in *Calcutta Asiatic Journal*, No. 104; Edward Conolly's *Sketch of the Physical Geography of Seistan*, in *Calcutta Asiatic Journal*, No. 103; Arthur Conolly *On a Mission into Khorassan*, in *Calcutta Asiatic Journal*, No. 110; Edward Conolly's *Journal kept while travelling in Seistan*, in *Calcutta Asiatic Journal*, No. 112; Dr. Griffith's *Extracts from a Report on subjects connected with Afghanistan*, in *Calcutta Asiatic Journal*, No. 118; Postan's *Memorandum on the Trade between the Towns of Shikarpore and Candahar*, in *Calcutta Asiatic Journal*, No. 109; Agha Abbas' *Journal of a Tour through Parts of Panjab and Afghanistan*, in *Calcutta Asiatic Journal*, No. 139; Captain Drummond *On the Mines and Mineral Resources of Northern Afghanistan*, in *Calcutta Asiatic Journal*, No. 109; *The Bolan Pass*, in *London Geographical Journal*, vol. xii.; Forster's *Journey from Bengal to England, through the Northern Parts of India*; MacFarlane's *Indian Empire*, 2 vols. 12mo.)

AFRICANUS, SEXTUS CAECILIUS, a Roman jurist. Many excerpts from his Nine Books of Quaestiones are contained in the Digest. [JUSTINIAN'S LEGISLATION, P. C.] Africanus often cites the Responsa or opinions of Salvius Julianus, who lived under Hadrian; and he was a pupil or friend of Julianus, and consulted him. (*Dig.* 25, tit. 3, s. 3.) This fixes the period of Africanus to the reign of Hadrian, who died A.D. 138, and to that of his successor Antoninus Pius. The fact of Africanus being quoted by Paulus and Ulpianus shows that he was prior to these two jurists. In a passage in Gaius (ii. 218) which has been referred to in order to show that Julianus commented on Sextus, the true reading is probably 'et Sexto,' instead of 'ex Sexto;' and this Sextus may be Sextus Pomponius. As Julianus belonged to the legal sect of the Sabiniani, it is probable that Africanus also did. Aulus Gellius (xx. 1) has given the substance of a discussion between Sextus Caecilius, a distinguished jurist, and Favorinus, a philosopher, on the Twelve Tables; and the date of the Twelve Tables is fixed in this discussion as near seven hundred years prior to the time of Gellius. As Gellius probably was not living later than A.D. 170, and the Laws of the Twelve Tables were finally enacted B.C. 449, the number of seven hundred is too much by a century for the age of Gellius. This error is no objection to our concluding that the Sextus Caecilius mentioned by Gellius is Sextus Caecilius Africanus. The excerpts of Africanus treat of many subtle legal points, and have been well illustrated by Cujacius (*Opera*, tom. i. tract. 9).

The jurist Africanus mentioned by Lampridius (*Alex. Severus*, c. 68) as living in the reign of Alexander Severus is a different person from this Africanus: or Lampridius has made some blunder, either in the name or in the period to which he assigns this jurist.

AGATHARCHUS (Ἀγάθαρχος), a Greek painter, who apparently, from a passage in Vitruvius, may be considered, if not the inventor, at least the first artist who applied the laws of perspective practically in painting. He painted a dramatic scene for Aeschylus in perspective, which was the first work of the kind exhibited to the Greeks; as the contemporary of Aeschylus therefore, he was a man of mature years about 480 B.C.

The words 'scenam fecit,' in the passage in Vitruvius referred to, have been interpreted, *he constructed a stage*, but this interpretation is shown by the context to be incorrect, the whole passage is as follows: 'When Aeschylus was exhibiting tragedies at Athens, Agatharchus *made a scene*, and left a treatise upon it. With the assistance of this treatise, Democritus and Anaxagoras wrote on the same subject, showing how the extension of rays from a fixed point of sight should be made to correspond to lines according to natural reason, so that the images of buildings in *painted scenes* might have the appearance of reality; and although painted upon flat vertical surfaces, some parts should seem to recede and others to come forward.'

This kind of scene-painting was termed Scenography (σκηνογραφία) by the Greeks, and was sometimes practised by architects; Diogenes Laertius mentions Clisthenes of Eretria as scenograph and architect. Aristotle gives Sophocles the credit of introducing scene-painting: he may have first treated it as indispensable in a dramatic representation, and rendered the practice common, or Vitruvius may have erroneously ascribed its introduction to Aeschylus instead of Sophocles.

There was another Greek painter of the name of Agatharchus, who lived about half a century later than the above. He was contemporary with Zeuxis, and Plutarch relates an anecdote of the two, how Zeuxis reproved Agartharchus for boasting in company of the rapidity with which he painted, by quietly observing that he (Zeuxis) painted very slowly. This Agatharchus is the painter whom Alcibiades shut up in his house until he had painted certain pictures in it. The circumstance is noticed by Plutarch and by Andocides, but they give different accounts of the conclusion of the affair.

(Vitruvius, vii. *Praef.*; Diogenes, ii. 125; Aristotle, *Poetic*, iv.; Plutarch, *Pericles*, 13, *Alcib.* 16; Andocides, *Orat. in Alcib.* 7.)

AGATHIAS (Ἀγαθίας), a Greek historian and poet, who lived under the emperors Justinian and Justinus the Younger. He was a son of Memnonius, and born at Myrina in Asia Minor, about A.D. 536, but he received his education at Alexandria, whence he went in A.D. 554 to Constantinople, where his father seems to have settled during his son's stay at Alexandria. Agathias now commenced studying the law, and afterwards distinguished himself as a speaker in the courts of justice. The title of Scholasticus (Σχολαστικός), which some writers give him, and which appears in the MSS. of his work, refers to his profession of advocate, for scholasticus at that time signified an advocate. But notwithstanding the great reputation he thus acquired, he never liked his profession, which he practised, according to his own account, only for the sake of gaining a livelihood: his favourite pursuits were poetry and history. He was esteemed by many of the most distinguished men of the time, and seems to have been rather given to courting the great. Some of his epigrams, which are still extant, contain incontrovertible proofs that Agathias was a Christian. He died about A.D. 582, in the reign of Mauritius Thrax.

Agathias was the author of the following works:—1, 'Daphniaca' (Δαφνιακά), or a collection of erotic poems in hexameter verse. It consisted of nine books, but is completely lost. Agathias himself calls it a juvenile production. 2, 'Cyclus' (Κύκλος), that is, a poetical anthology, in which he collected the poems of his contemporaries, especially of his illustrious friends, and also many of his own. The collection itself is lost, with the exception of the introduction, which Agathias wrote. His epigrams, which are still extant in the 'Greek Anthology,' may originally have formed a part of the 'Cyclus:' they show that Agathias had considerable poetical talent and wit. 3, 'History of his own Time,' is the most important among his works, and is complete, at least as far as he wrote it; for it breaks off abruptly in the twenty-fifth chapter of the fifth book, probably in consequence of the author's death; for he himself states that this history was commenced at a late period of his life. It contains the history of the short period from A.D. 553 to 559. He appears throughout this work as a good and honest man, and as a faithful historian. His great faults are ignorance of historical and geographical matters, especially with regard to everything connected with the west of Europe. His language is a tasteless compound of nearly all the dialects of antient Greece, in which however the Ionic predominates. Among the editions of this work the most important are that of Bonaventura Vulcanius (Lugdun. 1594), those in the Paris and Venice collections of the Byzantine writers, and above all that of B. G. Niebuhr, which forms the third volume of the 'Corpus Scriptorum Historiae Byzantinae' (Bonn, 1828, 8vo.), and contains a good account of the life of Agathias, and also his Epigrams.

A'GATHON, a native of Sicily, succeeded Domnus in the see of Rome, A.D. 678. The Emperor Constantine Pogonatus having convoked a general council at Constantinople, A.D. 680, Agathon sent legates to it, who concurred in condemning the heresy of the Monothelites, who contended that, in consequence of the union of the two natures in the person of Christ, there was in him only one will and one operation, an opinion which appears to have been till then countenanced by many prelates, and even by Pope Honorius I. These subtle metaphysical distinctions, to which the minds of the Orientals were prone, seem to have puzzled at times the more sober and matter-of-fact divines of the West. Constantine remitted in favour of Agathon the usual fine which the see of Rome paid to the emperor at every new election previous to obtaining the imperial confirmation of the bishop elect. The confirmation itself however continued to be required for a considerable time after, if not from the emperor, at least from the Exarch of Ravenna, who was the emperor's representative in Italy. Agathon died A.D. 682. He is numbered by the Church
Rome among its saints.

(Sandini, *Vitæ Pontificum Romanorum ex Antiquis Mo
mentis collectæ.*)

AGATHO'TES CHIRAYTA (Don, in *London*
Edinb. Philos. Mag. 1836), the latter being the spe
name, an imitation of the Sanscrit and Bengalee names
plant of the tribe of the Gentiancae, and so greatly resembl
a Gentian, that it is referred to that genus by Dr. Walli
who has figured it in his 'Plantae Asiaticae Rariores,' vol.
p. 33, t. 252. It has been known for a great length of
as a remedy in India, but has only recently been introd
into European practice. Indeed it has not yet been rece
into the London Pharmacopoeia; but has found a place on
that of Edinburgh: that it merits however a more exte
use is certain. It is probable that even in India two di
plants, both gentianaceous, are designated by the name
rayta; at least Dr. F. Hamilton Buchanan found in N
two so termed. The smaller of the two is that which i
treated of. Continental pharmacologists have had some
the one, sometimes the other, supplied to them. Henc
erroneous accounts are met with of the habitudes and ph
characters of the Chirayta. Geiger describes it as a per
plant, native of Egypt as well as India, and of larger
sions than the plant now intended. The genuine Chir
an annual plant, about three feet high, flowering in the
season. The whole plant is taken up, and the prope
for collecting it is just when the flowers begin to w
When dried it has an intensely but agreeable bitter
and is destitute of aroma. The root is possessed of
greatest bitterness. The bitter principle is readily impa
to water and to alcohol. As it is not easy to ascertain w
plant the continental chemists analyzed, it seems best to foll
the analysis of Mr. Battley, whose specimens must have be
genuine, having been furnished by Dr. Wallich. Accordi
to this chemist, it contains a free acid, a bitter resinous extr
tive, with much gum, and chlorates, with sulphates, of pot
and lime. No alkaloid has been detected in it; what is the
fore sold as a sulphate of chiraytine is well known to be
the disulphate of quinia. In regard to the pharmaceut
preparations of chirayta, infusion and watery extract, or a t
ture of it, are alone to be recommended. Not only is the
coction a most improper form, but an infusion made
warm water is to be condemned, as this causes most distres
headache. Even to form the cold infusion a pint of w
should not stand more than twenty minutes on half an ounc
the bruised plant. The tincture is a grateful addition to i

Chirayta possessses the general properties of bitter to
but has at the same time some peculiar to itself, which
well for certain forms and complications of disease. Un
most other tonics, it does not constipate the bowels, but t
to produce a regular action of the alimentary canal, eve
those subject to habitual constipation. During its use,
bile becomes more abundant and healthy in character.
tendency to excess of acidity in the stomach, with diseng
ment of flatus, is much restrained by its use. These qual
fit it in a most peculiar degree for the kind of indiges
which occurs in gouty persons. It may, when necessary,
associated with alkaline preparations or with acids;
latter are generally preferable. The same remark applie
its employment in the treatment of scrofula, in which alk
are so freely and often injuriously employed. As a rem
against the languor and debility which affect many person
summer and autumn, nothing is equal to the cold infusio
this plant. It may be taken twice or even more freque
daily, for a considerable time; then discontinued, and af
wards resumed. Children take it more readily than
other bitters. It is found to be a very efficacious remed
India against intermittents, particularly when associated
the Guilandina Bonduc, or Caranga nuts. The debility wh
is apt to end in dropsy is often speedily removed by infu
of Chirayta; to which is added the tincture formed of it
orange-peel and cardamoms. Its efficacy in worm-cases
procured for it the name of *worm-seed* plant. The extrac
given with great benefit in some forms of diarrhoea and dys
tery, particularly if combined with ipecacuan, the em
tendency of which it very markedly controls.

It is unnecessary to enter here into a review of the ar
ments adduced by Fee (*Cours d'Histoire Naturelle Pha*
ii. p. 395) and Dr. Royle (*Flora of the Himalayas*, p. 27
to disprove the notion of Guibourt that this was the *Cala*
verus of the antients. It is more probable that it was a gr
possibly that which in the present day is said to yield

l of Namur. Whencesoever obtained, this oil possesses
rtues. It is much used in India against rheumatism.
he power in a most remarkable degree of preventing
t of the head from falling off after acute diseases, such
ns, or after confinements or prolonged nursing. It
stores it after it has fallen off. But it must be strong
re; not the diluted feeble oil sold by perfumers under
me of oil of grass.

EN. [Lot and Garonne, P. C.]

LAOPHON (Ἀγλαοφῶν). There were two distin-
l Greek painters of this name, who were probably related.
r supposes that the younger was the grandson of the
and the son of Aristophon, the brother of Polygnotus.
elder Aglaophon lived about 500 B.C., and was a native
island of Thasos, where his son Polygnotus was also
Aglaophon's greatest distinction is that of having
he father and the instructor of Polygnotus, who is the
ainter recorded in history who attained great fame.
ian is the only writer who speaks of the style of
phon, but he indiscriminately couples him with Poly-
. He says, 'Notwithstanding the simple colouring of
otus and Aglaophon, which was little more than the
ginning of what was afterwards accomplished, many
rtainly with some affectation, preferred their works to
f the greatest masters who succeeded them.' There
s little doubt that this passage refers to the elder, as
following from Cicero refers to the younger: Cicero
aking of styles, Aglaophon, Zeuxis, and Apelles
different in their several styles, yet each was perfect
n style.

of the works of the elder Aglaophon are particularly
d, unless the Winged Victory spoken of by the
on the Birds of Aristophanes (v. 573) may be attri-
him.

o pictures of Alcibiades mentioned by Athenaeus must
by the younger. After Alcibiades, says Athenaeus,
to Athens a victor at the Olympic games, he exhi-
pictures of himself, one representing Olympias and
wning him, and in the other he was painted extremely
lying on the knees of Nemea. Plutarch attributes
of these pictures to Aristophon, the brother of
, and the supposed father of the younger Aglaophon,
ccount of Athenaeus accords better with the time,
robably correct, at least under the supposition that
two artists of this name. The beautiful horse
y Aelian was probably the work of the younger

Ἀγλαοφῶν; Quintilian, *Inst. Orator.* xii. 10. 3;
xii. 534; Plutarch, *Alcibiades*, 16; Cicero, *De*
; Aelian, *De Anim. in Epilogo.*)

TUS, the remarkable fossil genus of Crustacea
d with Asaphus Buchii and other trilobites in the
ozoic strata. (Brongniart.) Called Battus by
t abounds near Llandeilo and Christiania.

HERIUM, a fossil genus of Mammalia.

ULTURAL INSTITUTIONS. In this article
d to give some account of various institutions for
ment of agriculture, beginning with the Board of

i-official institution was established chiefly through
s of the late Sir J. Sinclair, and was incorporated
t was annually assisted by a Parliamentary grant.
first proceedings was to commence a survey of all
counties on a uniform plan, which brought out,
rmation of the class most interested in adopting
ved practices, originating in individual enterprise
ce, and which were confined to a particular dis-
'Surveys' are many of them imperfectly executed,
re useful at the time in developing more rapidly
ural resources of the country. During the years
t the end of the last and beginning of the pre-
y, the Board of Agriculture took upon itself to
l, as far as possible, provide remedies for the
collecting information and making reports to the
on the state of the crops. The statistics which
collected were also at times made use of by the
at least were believed to be so, in connection with
of taxation. The Board encouraged experiments
ements in agriculture by prizes; and it naturally
nsiderable influence over the provincial agricultural
The Board of Agriculture was dissolved in 1816.
ield Cattle Club, which has been in existence half a century, and some of the provincial agricultural societies, especially the Bath and West of England society, which commenced the publication of its 'Transactions' nearly seventy years ago, have been very useful in promoting agricultural improvement. Until within the last few years, the exertions of Agricultural Societies have been too exclusively devoted to the improvement of stock.

With the establishment of the 'Royal Agricultural Society of England' a new æra commenced in the history of institutions for the improvement of English agriculture. This Society, when it was established, in May, 1838, consisted of 466 members. At the first anniversary, in May, 1839, the number of members had increased to 1104; in May, 1840, there were 2569 members; in December of the same year, 4262; in December, 1841, 5382; in May, 1842, 5834; and by the following May, 1843, the number had been increased by the election of 1436 new members. At the sixth anniversary of the Society, in May 1844, the number of members was 6927, of whom 274 had been elected in the preceding three and a half months; and there had previously been struck off the list 249 names of members who were either dead or had not paid their subscriptions. The number of life-governors (who pay on admission the sum of 50*l.*) was 97 in December, 1844; and there were 208 annual governors, who pay 5*l.* yearly; of life members, who pay 10*l.* on admission, there were 470; and of annual members, who pay 1*l.* yearly, there were 6827. At the above date the funded property of the Society amounted to 7700*l.*, and the current cash balance to 2000*l.* On the 26th of March, 1840, the Society received a charter of incorporation, on which it assumed the designation of the 'Royal Agricultural Society for England.' By the 22nd rule of the Society, 'No question shall be discussed at any of its meetings of a political tendency, or which shall refer to any matter to be brought forward, or pending, in either of the Houses of Parliament;' and this rule is made permanent by the charter of incorporation.

The objects of the Royal Agricultural Society, as set forth in the charter of incorporation, are: 1, To embody such information contained in agricultural publications and in other scientific works as has been proved by practical experience to be useful to the cultivators of the soil. 2, To correspond with agricultural, horticultural, and other scientific societies, both at home and abroad, and to select from such correspondence all information which, according to the opinion of the Society, may be likely to lead to practical benefit in the cultivation of the soil. 3, To pay to any occupier of land, or other person, who shall undertake, at the request of the Society, to ascertain by any experiment how far such information leads to useful results in practice, a remuneration for any loss which he may incur by so doing. 4, To encourage men of science in their attention to the improvement of agricultural implements, the construction of farm-buildings and cottages, the application of chemistry to the general purposes of agriculture, the destruction of insects injurious to vegetable life, and the eradication of weeds. 5, To promote the discovery of new varieties of grain, and other vegetables, useful to man, or for the food of domestic animals. 6, To collect information with regard to t[illegible] management of wood, plantations, and fences, and on every other subject connected with rural improvement. 7, To take measures for the improvement of the education of those who depend upon the cultivation of the soil for their support. 8, To take measures for improving the veterinary art, as applied to cattle, sheep, and pigs. 9, At the meetings of the Society in the country, by the distribution of prizes, and by other means, to encourage the best mode of farm cultivation and the breed of live stock. 10, To promote the comfort and welfare of labourers, and to encourage the improved management of their cottages and gardens.

The Society has already directed its attention to nearly all the objects above mentioned. The country meetings which take place annually in July, have perhaps been more serviceable in stimulating agricultural improvement than any other of the Society's operations, by concentrating the attention of the Society upon each part of the country in succession, and by exciting the attention of each district to the objects which the Society is intended to promote. England and Wales are divided into nine great districts, and a place of meeting in each is fixed upon about a year beforehand. In 1839, the first meeting was held at Oxford; and others have been successively held at Cambridge, Liverpool, Bristol, Derby, and Southampton. The meeting for 1845 will be held at Shrewsbury; in 1846, in some town in the Northern district; and in 1847 the circuit will be completed by the meeting being held in the

South Wales district. The value of the prizes distributed in 1839, at Oxford, amounted to 790*l.*; and in 1844, at the Southampton meeting, to 1400*l.* The show of agricultural implements at Derby comprised 700 different articles, and the aggregate value of implements, according to the selling price of each, declared by the makers, was about 7400*l.* There can be no doubt that the mechanics of agriculture have made great progress since the establishment of the Society. The opportunity of contrasting and estimating the utility of various implements used for similar purposes in different districts or in different soils, cannot fail to extend improvement from one district to another. It has been said that even down to the present time the north and west of England have little more acquaintance with the practices of each other than two distinct nations might be supposed to possess; and one of the principal results effected by such institutions as the Royal Agricultural Society is to introduce the best practices of husbandry from the districts where agriculture is in its most improved state into those where it is most backward. Attached to the Society's house there is a reading-room, and a library, to which has recently been added by purchase the books forming the library of the late Board of Agriculture. As a means of diffusing information on agricultural subjects, the publication of the 'Journal' of the Society was commenced in April, 1839, and it has at present a circulation of nearly 9000. The prize essays and all other communications intended for publication in the 'Journal' are referred to the Journal Committee, who decide upon the arrangements of the work. The 'Journal' contains besides very valuable contributions of a practical as well as scientific character. Prizes have already been awarded for essays on the agriculture of Norfolk, Essex, and Wiltshire; and the agriculture of Nottinghamshire, Cornwall, and Kent will be the subject of essays to be sent in by March, 1845.

The success of the Royal Agricultural Society has revived the spirit of existing associations, or led to the formation of new ones. In Johnson and Shaw's 'Farmer's Almanac' for 1845, there is a list of agricultural societies in the United Kingdom, but it is confessedly imperfect: the number cannot be less than four hundred. Some of the provincial agricultural societies are on a scale which a few years ago could scarcely have been anticipated. The Yorkshire Agricultural Society holds its annual show in the different towns of that county in rotation, a plan which is very successful in rendering them attractive. Farmers' clubs have also recently become very numerous. The 'Farmers' Almanac' for 1845 gives a list of above one hundred and fifty of these clubs. They are eminently practical; but the local results which they collect and discuss may become applicable to other parts of the country placed under similar circumstances of aspect, soil, and situation. It would stimulate the exertions of these clubs, if a department of the 'Journal of the Royal Agricultural Society' were reserved for some of the best papers read at their meetings. The annual report of every farmers' club should be transmitted to the secretary of the Royal Agricultural Society; and the title at least of all papers read at the meetings during the year should be given in the 'Journal.'

The agriculture of Scotland has been largely indebted to the societies which have been established at different periods for its improvement. A 'Society of Improvers in the Knowledge of Agriculture in Scotland' was established in 1723, and some of its Transactions were published. The society becoming extinct, was succeeded by another in 1755; and the society which now stands in the same relation to Scotland as the Royal Agricultural Society to England was established in 1784. It is entitled the 'Highland and Agricultural Society of Scotland.' The constitution and proceedings of the society are as nearly as possible similar to the English society. The society publishes quarterly a very excellent Journal of its Transactions, which has at present a circulation of 2300. The Agricultural Museum at Edinburgh was assisted in 1844 by a parliamentary grant of 5000*l.*

The Royal Dublin Society, like the Society of Arts in England, awarded prizes for the promotion of the useful arts generally, and are neither of them, properly speaking, agricultural institutions. In 1841 the 'Royal Agricultural Improvement Society of Ireland' was established on the plan of the Royal Agricultural Society of England; and in May, 1844, the number of subscribers was 581. The society already possesses funded property to the amount of 4859*l.* Since its establishment great progress has been made in the formation of local societies in connection with the central society. This is the best means of ensuring the support and co-operation of the agricultural class in every part of the country. In 1841 there
were only twenty-three of these bodies in existenc
half-yearly meeting in May, 1844, it was stated t
ber was not less than one hundred. A very judic
ment has been made relative to the prizes distril
local meetings, which are now given for the
husbandry only, the premiums for stock being
the local association. The society is establishin
tural museum in Dublin for the reception of in
husbandry, seeds, grasses, &c.; it circulates pract
tion connected with husbandry by means of ch
tions; and one of its objects is the organization o
tural college.

In England there are no institutions of a p
which combine scientific with practical instruc
culture. The advantage of establishing such a
was suggested by the poet Cowley; and in 17
published 'Proposals for a Royal Institute or Col
culture and other branches of Rural Economy.'
Sibthorpian Professorship of Rural Economy in th
of Oxford; at the University of Edinburgh th
fessorships of agriculture and agricultural chemi
the University of Aberdeen there are lectures on
The botanical, geological, and chemical profes
lectures in the different universities are however,
extent, auxiliary to the science of agriculture. In
of such establishments as the one at Grignon in F
men are sent at a great expense as pupils to fa
counties where the best system of agriculture
especially Norfolk, Lincolnshire, Northumberla
Lothians; but although this may be a good plan
practical knowledge, it is imperfect as regards acqui
ledge of the scientific principles of agriculture.
Ducie has established a model or example farm
in Gloucestershire; and farms of this descriptio
siderable local advantage. Such a farm, says I
'if well conducted, cannot fail to benefit the farn
by exhibiting to them improved implements; by
greater economy of labour, demonstrating for
possibility of ploughing with two horses on
three or four are usually employed; by reduci
proof the benefits of thorough-draining; by
methods of preserving the liquid portion of the
effectually; and by suggesting a thousand other i
upon the ordinary routine;" but he contends t
farm on a private estate cannot be wholly mana
eye to the instruction of others, and instead of bei
on a sound system it may be devoted to fanciful
at the caprice of the proprietor. (Dr. Dauber
May 14, 1844.) In 1839 the late B. F. Dupp
lished a short pamphlet entitled 'Agricultural
Schools for the Sons of Farmers,' which contains
suggestions for the establishment of such insti
laboured indefatigably in the promotion of this obj
bably would have succeeded, but for his prematu
the projected Agricultural College and model Fa
cester, the pupils will receive an education at o
and scientific, under a person thoroughly acquain
management of a farm, associated with a profess
try, mechanics, &c.

Schools of industry, similar to the one establ
late Rev. W. L. Rham at Winkfield, may b
medium of imparting an acquaintance with the
agriculture, which at present the labouring cl
usually obtain; and they obviate the objection
who remains long at school is unfitted for hard
Winkfield school there are attached about four a
land; and under the guidance of so accomplisl
culturist as the late Mr. Rham the scholars enjo
vantage of pursuing all the details of the most
bandry, and undergoing a course of training in
farm management of no ordinary excellence.
similar kind to the one at Winkfield have been e
Ockham, near Ripley, in Surrey; at Lindfiel
[ALLEN, WILLIAM, P. C. S.]; at Horne, near F
at Ealing Grove, Middlesex; at Crowborough, K
Tunbridge Wells. On Mrs. Davies Gilbert's est
school of manual labour, and the principle on
established might perhaps be made conducive on
to the two objects of enabling the scholars to acq
ments of learning and of fitting them by prop
training to become expert and industrious in fiel
work. At the school here spoken of, the master
penny per week for each boy; but the chief e

the master arises from the labour of the boys on the school land. Their time is divided into two portions, one part of which the master devotes to their instruction in reading, writing, &c., and in return they employ another portion of their time in cultivating his land. (*Committee of Council on Education*, 1844.)

In Ireland the government affords direct encouragement to agricultural education through the instrumentality of the Board of National Education. The persons who are trained for the office of teachers in the national schools are required to attend the lectures of a professor of agricultural chemistry; and during a portion of the time occupied in preparing for their future duties they are placed at the model farm at Glassneven, where they are lodged, and where, during five mornings of the week, they attend lectures on the principles of agriculture; and an examination subsequently takes place. On the sixth morning they are taken over the farm, and the various operations going forward are explained to them. The Board admits a certain number of in-door pupils for the term of at least two years, who pay 10*l.* a year for board, lodging, and education. They work on the farm, attend the lectures, and receive such instruction as qualifies them to fill the office of bailiffs. There is likewise a class of schoolmasters trained to conduct agricultural schools. It is intended to establish twenty-five agricultural model schools in different parts of the country. The Agricultural Seminary at Temple-Moyle, six miles from Londonderry, is one of the most successful experiments which has yet been made in the United Kingdom to establish an institution for agricultural education. It was founded by the North West of Ireland Society in 1827, and up to 1840 had been attended by 418 pupils. The plan is in some degree taken from the institution established by the late M. Fellenberg, at Hofwyl, in Switzerland. In 1841 the house contained 70 young men, as many as it can accommodate and the farm afford instruction to; and there were 40 applications for admission. The size of the farm is 172 acres. An account of the institution and of the course of instruction will be found in the 'Minutes of the Committee of Council on Education,' 1842-3, p. 565, 8vo. ed.

Such societies as the Scottish Agricultural Chemistry Association, established at the close of 1843, are very well calculated to advance the progress of scientific agriculture; and they can be established in any district where a sufficient number of subscribers can be obtained to command the services of a competent chemist. Associations of this nature show how much can be done in this country without any assistance from the state. The object of the Scottish association is the diffusion of existing information, theoretical and practical, by means of occasional expositions, addresses, and correspondence; and secondly, the enlargement of the present store of knowledge by experimental investigations of practical agriculturists in the field and of the chemist in the laboratory. Landed proprietors who subscribe twenty shillings yearly, and tenants who subscribe ten shillings yearly, are entitled to have performed analyses of soils, manures, &c., according to a scale fixed upon; and if more than a certain number are required, a charge of one-half above the scale is made. Letters of advice, without an analysis being required, are charged 2*s.* 6*d.*, and at present the number which each subscriber may write is not limited. Every agricultural society subscribing 5*l.* yearly to the funds of the Association is entitled to one lecture from the chemist; if 10*l.* to two lectures, &c. Counties which subscribe 20*l.* annually are entitled to appoint a member of the Committee of Management. The Society in question has raised a fund sufficient to defray all expenses for the ensuing four years. The chemist of the association has his laboratory at Edinburgh, but he has to visit various parts of Scotland according to certain regulations.

In England, soils are analyzed at the Museum of Economic Geology, London, at a charge of one guinea. The establishment is under the superintendence of her Majesty's office of Woods and Forests.

In France there are schools assisted by the state, where young persons can obtain instruction in agriculture both practical and theoretical. The principal institution of this kind is that at Grignon, where one of the old royal palaces and the domain attached to it, consisting of 1185 acres of arable, pasture, wood, and marsh land, have been given up on certain conditions. The professors are paid by the government, and the pupils are of two grades, one paying 48*l.* a year, and the other 36*l.* For the purpose of imparting theoretical knowledge, courses of lectures are given on the following subjects: —1, The rational principles of husbandry, and on the management of a farm. 2, The principles of rural economy applied to the employment of the capital and stock of the farm. 3, The most approved methods of keeping farming accounts. 4, The construction of farm-buildings, roads, and implements used in husbandry. 5, Vegetable physiology and botany. 6, Horticulture. 7, Forest science. 8, The general principles of the veterinary art. 9, The laws relating to property. 10, Geometry applied to the measurement and surveying of land. 11, Geometrical drawing of farming implements. 12, Physics as applied to agriculture. 13, Chemistry, as applied to the analysis of soils, manures, &c. 14, Certain general notions of mineralogy and geology. 15, Domestic medicine, applied to the uses of husbandmen. The practical part of the education is conducted on the following system:—The pupils are instructed in succession in all the different labours of the farm. Some, for instance, under the direction of the professor of the veterinary art, perform the operations required by the casualties which are continually occurring in a numerous stock of cattle. Others are appointed to attend to the gardens, and to the following departments: woods and plantations; inspection of repairs taking place on the premises; making of starch, cheese, and other articles; the pharmaceutical department; book-keeping and the accounts. A daily register is kept of the amount of the manure obtained from the cattle of every kind. A pupil newly entered is appointed to act with one of two years' standing; and at the end of each week all are expected to make a report, in the presence of their comrades, of whatever has been done during the week in their respective departments. The professor, who presides over the practical part of their education, explains on the spot the proper manner of executing the various field operations; and he also gives his lectures on these different processes at the time when they are in actual progress. The professors in each department render their courses as practical as possible;—the professor of botany by herborizations; the professor of chemistry by geological excursions; the professor of mathematics, by executing, on the plan he has pointed out, the survey and measurement of certain portions of land. After two years' training in the theory and practice of rural economy, the pupils undergo an examination from the professors collectively, and, if satisfactory, a diploma is granted, which certifies to the capacity of the pupil for fulfilling the duties of what may be styled an 'Agricultural Engineer.'

Institutions designed for the improvement of agriculture, and supported by the state, have been established in most parts of Germany. In Prussia there is a public model farm and agricultural academy in nearly every province. The most important of these institutions is the one at Mögelin, in Brandenburg, about forty miles from Berlin, which was founded by the late king. Von Thaer was at one period the director. The establishment consists of a college and a model farm of 1200 acres. When visited by Mr. Jacob, in 1820 ('Agriculture, &c. of Germany'), there were three professors, who resided upon the premises: one for mathematics, chemistry, and geology; one for the veterinary art; and the third for botany and the use of the various vegetable productions in the Materia Medica, as well as for entomology. Attached to the institution there was a botanic garden, arranged on the Linnæan system; an herbarium; a museum containing skeletons of domestic animals, models of agricultural implements, specimens of soils, &c. The various implements were made in workshops upon the farm, and the pupils were expected to acquire a general notion of the modes of constructing them. The sum paid by each pupil was very high, not less than 80*l.* a year.

At Hohenheim, in the kingdom of Wirtemberg, two leagues from Stuttgard, an old palace has been appropriated as an agricultural college. The quantity of land attached to the institution is about 1000 acres. The pupils are of two grades, and those belonging to the superior class pay for their board 150 florins, and for their instruction 300 florins a year, or altogether 37*l.*, and extra expenses make the annual cost about 50*l.* Natives of Wirtemberg are admitted at a lower rate than the subjects of other states. The higher class of students do not, as at Grignon, take part in the actual labours of husbandry: but the means of theoretical instruction are very complete. Lectures are delivered by twelve professors on the following subjects:—Mathematics and physics, chemistry and botany, technology, tillage, and other departments of rural economy, forestry, and the veterinary art. The lectures are so arranged that they can be either attended in two half-years or three or four. In the former case much preliminary information must have been acquired. There is attached to the institution a small botanical garden; a museum of zoological, botanical, and mineralogical objects; skeletons of domestic animals; collections of seeds and woods; and a library of works on rural economy. The establishment also comprises a manufactory of beet-root sugar, a brewery, a distillery of potato-spirit, and there is an apartment devoted to the rearing of silkworms. A part of the farm is reserved for experiments. The second class of students do the manual labour, but they are nearly maintained at the expense of the institution, and, when they can be spared from field-labour, they have the opportunity of attending the lectures at the college.

In Bavaria the king has given up the domain attached to the royal palace of Schleissheim for the purposes of a model farm; but a great mistake has been made in selecting land much below the average standard of fertility, which, as well as land of extraordinary productiveness, should be avoided. It is on a much inferior scale to the establishment at Hohenheim. In 1840 there were twenty-one scholars who paid about 15*l*. a year, and eleven who paid about 6*l*. The latter are merely field-labourers; and those who belong to the upper class are about the same grade as the second class at Hohenheim.

There are agricultural institutions supported by the state in several other countries of Europe.

(*On public Institutions for the Advancement of Agricultural Science*, by Dr. Daubeny; Dr. Daubeny's *Lecture on Institutions for the Better Education of the Farming Classes, especially with reference to the proposed Agricultural College at Cirencester*, delivered at Oxford, May 14, 1844; *Journals of Royal Agric. Soc. of England*; Dr. Lindley's *Gardener's Chron. and Agric. Gazette*, &c. &c.)

AGRICULTURE (from the Latin *Agricultura*). The economical relation of agriculture to other branches of industry is the subject of the following remarks.

The question has sometimes been propounded whether agriculture or manufactures are more useful to a state, or, in other words, whether agriculture or other branches of industry contribute most to the wealth of a state; and whether a state should give more encouragement to agriculture or manufactures. Such questions imply that there is something which essentially distinguishes manufactures from agriculture; and also that a state can and ought to give a direction to industry. Agriculture is the raising of vegetable products from the soil, which are either consumed in their raw state or used as materials on which labour is employed in order to fashion them to some useful purpose. Manufactures, in the ordinary sense of the term, comprise the various modes of working up the raw products of agriculture and mining. So far there is a distinction between agriculture and manufactures; agriculture is auxiliary and necessary to the other. In the popular notion, the difference in these two processes, the raising of a product from the ground and the working up of the product into another form, constitutes an essential difference between these two branches of industry; and accordingly agriculture and manufactures are often spoken of as two things that stand in opposition or contrast, and they are often viewed as standing in a hostile opposition to one another. But such a distinction between agriculture and manufactures has no real foundation. Those agricultural products which are articles of food—as bread, the chief of all—are essentials, and the industry of every country is directed to obtaining an adequate supply of such articles, either from the produce of the country or by foreign trade. Some of the various kinds of grain which are used as food are the prime and daily articles of demand in all countries. Agricultural articles which are employed as materials out of which other articles are made, such as cotton, are only in demand in those countries where they can be worked up into a new and profitable form. The varieties of soil and climate render some parts of the world more fit to produce grain, and others more suitable for cotton. Ever since the earliest records of history the people of one country have exchanged their products for the products of other countries; and if the matter were simply left to the wants and wishes of the great majority of mankind, no one would trouble himself with the question of the relative superiority of the process by which he produces grain or cotton, and the art by which his cotton is turned into an article of dress in some other country, and sent back to him in that new form to be exchanged for grain or more raw cotton. He might not perceive any essential difference in the process of turning the earth, committing the seed to it, and reaping the crop at maturity; and the process by which the raw material which he has produced, such as flax or cotton, is submitted to a variety of operations, the whole of which consist only giving new forms to the material or combining it with oth materials. In both cases man moves or causes motion; h changes the relative places of the particles of matter, and th is all. He creates nothing; he only fashions anew. Th amount of his manual labour may be greatly reduced by me chanical contrivances, and perhaps more in what are calle manufactures than in what is termed agriculture; so that if th amount of the direct labour of hand is to be the measure of th nature of the thing produced, agricultural products are mo *manu*factures than manufactured articles are. Some branch of agriculture, such as wine-making, indeed belong as much manufactures, in the ordinary sense of that term, as they b long to agriculture. The cultivation of the vine is an essen part of the process of wine-making; but the making of wine is equally essential. Indeed there are few agricultu products which receive their complete value from wha termed agriculture. Corn must be carried to the market must be turned into flour, and the flour must be made bread, before the corn is in that shape in which it is re useful. Agriculture therefore only does a part towards process of making bread, though the making of bread is end for which corn is raised. It is true that in agricul countries the processes by which many raw products fashioned to their ultimate purpose, are often carried o agriculturists and on the land on which the products raised. But agriculture, as such, only produces the raw terial, corn, flax, grapes, sugar-cane, or cotton. If any ag culturist makes flour, linen, wine, sugar, or cotton-cloth, does it because he cannot otherwise produce a saleable com modity; but the making of flour or wine or cloth is a manu facturing operation, as the word manufacture is understood.

Besides the manufacture of agricultural products, there i the manufacture of the products of mines. A mine cannot b classed altogether either with manufactures or agriculture, a these terms are vulgarly understood. Mining produces ra products, which have no value till they are subjected to th various processes by which an infinite variety of useful articl are made out of them. So far mining bears the same relatio to certain branches of industry that agriculture does to oth branches of industry which it supplies with raw material Fisheries produce a supply of food, and are therefore precise like those branches of agriculture which are directed solely the production of food.

Now if the question be, which of all these branches of i dustry adds most to wealth, or, in other words, is most usef to mankind, the answer must be,—they are all equally usefu If it be urged that some are of more intimate necessity tha others, inasmuch as food is essential, and therefore its produ tion is the chief branch of industry, it may be replied, that the present condition of man it is not possible to assert th one branch of industry is more useful than another: each d pends on every other. Further, if food is essential to all m in all countries, clothing and houses are equally essential ev to the support of life in most countries; and the production clothing and the building and furnishing of convenient hous comprehend almost every branch of manufacturing indust which now exists. It is an idle question to discuss the relati value of any branches of industry, when we found the co parison upon a classification of them which rests on no re difference, and leave out of the question their aptitude minister to our wants. One might discuss the relative val of the manufacture of scents and perfumes, and the manufactu of wine and beer; and the foundation of the comparison value might be the number of persons who use or wish to u the two things, and the effect which the consumption of scen and perfumes on the one hand, and of wine and beer on th other, will have on the consumers and the condition of tho who produce them.

But though it is an idle question to discuss the relati value of the variety of processes included in the term agr culture, and of the infinite variety of processes included in th term manufactures, it is not an idle labour if we can show th such a discussion is worthless and can lead to no valuable r sults. It is not an idle labour to attempt to dissipate an err which affects the commercial policy of most nations, and is deeply rooted error in the minds of the ill-instructed, bo rich and poor. It was the opinion of a set of persons wh have been called the Economists, that agriculture was th source of all wealth, and therefore the most important branc of industry. This doctrine was founded on the assumptio that all the materials that we use are ultimately derived fro the earth. This, however, is not true: the products of th sea, of hunting, of mining, are not due to agriculture, even in the sense in which the advocates of this theory understood the term agriculture: and further, a large part of agricultural products receive most of their value from other labour besides agricultural labour. Even corn, the material of bread, as already observed, must undergo a manufacturing process before it becomes bread. But the greatest part of the corn that is produced has little value in the place where it is produced: it obtains its value by being transported to another place where it is wanted, and at a cost which forms a considerable part of its selling price. Lastly, the corn is of no value even when it has thus been removed from one place to another, unless it has been removed to a place where it is wanted by those who are not raising corn, but are producing something to give in exchange for it. The value, then, of the corn depends ultimately on the labour and the wants of those who do not concern themselves about its production.

If those who possess political power were free from all prejudices and all motives of self-interest, or what they suppose to be their interest, there would neither be encouragement nor discouragement given to any branch of industry, and least of all to agriculture. If taxes must be raised, they would be raised in such way as would least interfere with the free exercise of all branches of industry; and they would not be raised upon raw products of any kind. It is the business of a State to find sufficient means, at the least possible cost to the whole community, for defence against foreign aggression, for the administration of justice, and for all such matters of public interest as require its direction and superintendence. To ascertain what these matters may be and how they are to be effected, belongs to the subject of government; and the sphere in which the State should limit its activity cannot be exactly defined. But there is one principle which excludes its interference from many matters; which is this:—If men are not interfered with, they will employ their labour and capital in the way which is most profitable to themselves; and each man knows better how he can employ himself profitably than anybody else can, or any government can, whether such government is of one or many. Agriculture is no exception to this general principle; and there is no reason of public interest why a government should either encourage it or discourage it. In order that the agriculture of a country may attain its utmost development, it is necessary that it be free from all restraint, and that it be also free from the equally injurious influence of special favour or protection.

But no governments have ever let the things alone which they ought not to have meddled with; and agriculture has been subject perhaps to more restrictions than any other branch of industry. The interference with agricultural industry lies deeper than at first sight appears. Land is an essential element of a state: it is the basis on which the structure is raised. Now the political constitution of every country is intimately connected with the nature of the landed property; and if we would really trace the history of any nation from the earliest records to the present time, we must begin with the fundamental notions of the law of property in land. In this country for instance it is easily shown that the present mode in which land is held and occupied is the result of those feudal principles which were established, or confirmed and extended, by the Norman conquest of England. The various modes in which land is held by the owner and occupied by the cultivator, the modes in which it may be alienated or transmitted by will or by descent, the burdens to which it is liable either on any change of owner or in any other way, are all important elements in estimating the degree of freedom which agriculture enjoys. The political constitution of a country also materially determines whether the land shall be cultivated in large or in small portions, whether owned by a numerous body or owned by a few; there may also be positive laws which affect the power of acquiring land or disposing of it; and these circumstances materially affect the freedom of agriculture and its condition. The political constitutions of countries, so far as we know them, have not been the result of design. We of the present generation find something transmitted to us which our predecessors have been labouring to amend or deteriorate; they in like manner received it from their predecessors; but the beginning of the series we cannot ascend to. Still every existing generation can do something towards altering that which has been transmitted to it; and every act of legislation which interferes with the mode in which land is acquired or enjoyed materially affects the condition of agriculture. No sufficient reason has ever yet been shown why a man should not, as a general rule, acquire as much land as he can, and dispose of it as he pleases either during his lifetime or at his death. Though this general principle must be admitted, it may still be laid down as a safe rule that there are limits within which a man's power over his property in land ought to be circumscribed. He should not be allowed, for instance, to determine for generations to come what persons or class of persons shall enjoy his land, and to limit the power of alienating it; unless it may be when his property is given for public purposes of unquestionable utility. For with this limitation, it follows that when the purposes cease to be of unquestionable utility, the State ought to apply the property to new and useful purposes. There are therefore limits which ought to be placed to a man's power over his land. But such limits should not in any way limit the productive use that can be made of the land; one object of fixing such limits, whatever they may be, is to prevent any large amount of land from being withdrawn permanently out of the market. In a rich country, where great fortunes are acquired by commerce and manufacturing industry, there are always men who wish to invest money in land, and it is for the public interest that there should be opportunities of making such investments.

The tenure of land in any country may be unfavourable to the improvement of its agriculture. If the object is to encourage agriculture in the only way in which a State can profitably encourage it, all restrictions that arise from the peculiar tenure of land should be removed. But the mode in which land is held may have a political character, and this may be an obstacle to the giving to agriculture that freedom which is necessary for its improvement. It might be considered that in this country it would be politically useful to forbid those large accumulations of land in the hands of individuals, a condition which is accompanied with a diminution in the number of small landowners. But if it were wise in some points of view to enact a law that should limit the quantity of land that a man may hold, it would be very unwise in other points of view; and such a law would also easily be evaded. The Agrarian laws of Rome only applied to the Public Land, but among other matters they limited the amount of such land that a man could occupy and use. These laws were continually evaded. But besides this, an injury was done to agriculture, that is, the amount of useful produce was diminished by preventing large capitalists from occupying as much of the land as they pleased, subject to the rent which was due to the State. The specious object of the Agrarian laws was to give small cultivators the use or ownership of a portion of the public land, and thus to rear up a body of independent free agriculturists; for the larger farms were cultivated by slaves. Though these laws were not an interference with private property, as the term is properly understood, they interfered with the profitable employment of capital; and they failed in accomplishing their professed object. Some instances are given under the article ALLOTMENTS, P. C. S., of the gradual decrease of small farms in England and their consolidation into large farms, a process which will certainly take place in all countries where there is no positive obstacle, whenever capital is become abundant.

The political constitution of a State may therefore encourage or discourage agriculture; and laws may be from time to time enacted which shall have the same effect. Such laws have sometimes an object purely political, that is to say, a law may be passed which shall have a direct object, not agricultural, and yet it shall indirectly affect agriculture. Any institution or law which in any way either prevents large masses of land from being owned or cultivated by individuals, or which results in a great subdivision of land among owners and occupiers, has an indirect effect on agriculture. Those who cultivate on a small scale cannot enter into the market in competition with those who cultivate on a large scale. A State which consists solely of small landowners must be a feeble political body, and the amount of surplus produce which can be raised will be small. Such a community, if it has no the resources of foreign commerce, will in seasons of scarcity run the risk of famine. The most profitable size of farms depends on a variety of considerations, but whatever it may be, the profitable measure will be practically determined in a country where land can be freely bought or hired, and where capital and labour are abundant. In such a country, and where there is a considerable extent and variety of surface, i is probable that circumstances will produce farms of every size from the smallest unprofitable holdings to the largest farm which can be managed with profit.

Where land is hired by the cultivator, it is an essential condition to good agriculture that there should be farms to hir which permit and require the employment of large capitals. It is also necessary that he who hires the land shall be able to secure the use of it for a period long enough to induce him to cultivate it in the best way, and to make those improvements the fruit of which cannot be reaped all at once. It is a last and equally important condition that he should not be restrained in his mode of cultivation. Small farms, short leases, or uncertain terms of years, and conditions which prescribe or limit the mode of cultivation, will infallibly produce bad agriculture.

The productive power of agriculture is not free in any country when the agriculturist is fettered by restrictions upon the sale of his produce; whether the restrictions are imposed by his own State and exclude him from selling his produce where he can, or whether they are imposed by another State which refuses to receive his surplus produce. In neither case will agriculture attain the development of which it is capable. In France the free intercourse between the different provinces of the kingdom was once impeded by many restrictions, and corn could not be taken even from one province to another. [France, P. C., p. 431.] The consequence was that agriculture was in a wretched condition, but it improved when the restrictions were removed. The history of all countries shows that the interference with the power of disposing of agricultural produce has been unfavourable to agriculture, and consequently injurious to the whole community. Nor is the agriculture of a country free when the land or its products are subject to heavy taxes, direct or indirect. Such taxes raise the price of agricultural produce, and so far diminish the power of persons to buy it; they also increase the amount of capital requisite for cultivating a piece of land, for the payment of the taxes is not always made to depend on the amount of produce raised, or on the time when the produce is by sale converted into money. Payments the amount of which is fixed with reference to the productive powers of the land or which depends on the actual amount of produce, may either be in the nature of rent, that is, the amount which a cultivator agrees to give to the owner of the land for the use of it; or they may be payments which the land owes to some person or persons not the owner or owners, and quite independent of the payment due to the landholder: to this second class of payments belong Tithes. The cultivator of the Roman Public Land paid the State a tenth of the produce of arable land, and a fifth of the produce of land planted with productive trees. But this second class of payments is an obstacle to improvement, for the occupier must lay out capital in order to increase the produce of the land; and it will often happen that he pays the tenth of the produce before he has got back his capital, and long before the outlay brings him a profit. The money payment which a man makes to the owner of land for the use of it, is or ought to be the value of the produce which remains after all expenses of cultivation and all costs and charges incident to the cultivation are paid, and the average rate of profit also is returned to the cultivator; at least this is the general mode in which the amount of rent under ordinary circumstances will be determined. It may therefore be as low as nothing. How high it may be depends on various circumstances.

If the agriculture of a country is free from all restrictions, it may in a given time reach the limit of its productive powers. In a country which has a considerable extent of surface and variety of soil, this limit may not be reached for many centuries, because improvement in agriculture is slower than in almost every other branch of industry. The best lands will be first occupied, and carelessly cultivated, as in America; the inferior lands will in course of time be resorted to, and finally the results of modern science will be applied to improve the methods of cultivation. An agricultural country, or a country which produces only raw products, and has no manufactures, will have reached the limit of its productive powers when it has raised from the soil all that can be profitably raised. Whether it will have a large surplus agricultural produce or not, will in a great degree depend on the size of the farms; but in either case the country will have attained the limit of its productive powers under the actual circumstances in which the agriculture is carried on.

But a country which also abounds in manufacturing industry may continue to extend its productive powers far beyond the limits of its agricultural produce. Part of the agricultural produce will be food, but when the producible amount of food has reached its limit, the productive power of manufactures has not reached its limit also; and this makes a real distinction between agriculture and manufactures. Great Britain, for instance, might not be able to raise more food than is sufficient for its actual population, but Great Britain could supply the world with cotton-cloth and hardware. A country of any considerable extent with a fair proportion of good soil will always be to a considerable extent an agricultural country, for, under equal circumstances of taxation with other countries, it will always be as profitable to cultivate the good lands of such country as to import foreign grain, the price of which is increased by the cost of carriage and contingent expenses. But a time will come in all countries which contain a large population not employed in agriculture, when foreign grain can be imported and sold at a lower price than grain can be produced on poor soils; and if there is no restriction placed on the importation of grain, experience will soon show when it is more profitable to buy what is wanted to supply the deficiency of the home produce than to attempt to raise the whole that is wanted by cultivating poor soils. No country of large extent with a great population could obtain the whole supply of corn by foreign commerce; such an instance is not on record. But a manufacturing country which has up to a certain point produced all the food that is required for its population, will be stopped short in the development of its manufacturing power, if from any cause whatever it cannot obtain an increased supply of food. An increased supply of food and an increased supply of raw produce are the two essential conditions, without which the manufacturing industry of a country must ultimately be limited by its own power to produce food. If the increased supply of food can be obtained from foreign countries, it is a matter of indifference to all who consume the food where it comes from; and the agriculturist himself, as far as he is a consumer of food, is benefited with the rest of the community by the greater abundance of food caused by the foreign supply and by the increased productive powers of the manufacturer. It is not necessary to determine how the increased supply of food will operate on wages or on profits, or on both: it is enough to show, that a time must come when there can be no increase in manufacturing power, if the supply of food is limited to what the country produces, and that by an addition to the supply of food an additional power is given towards the production of those articles which have reached their limit because the supply of food cannot be increased.

A country which has already produced from its best and its second-rate soils as much as these soils can produce in the actual state of agriculture, will begin to import grain from other countries, if there are no restrictions on importation. For capital will be more profitably employed in buying and importing foreign corn from countries where it is abundant than in raising it at great cost from inferior soils at home. It is generally assumed that the country which exports grain will take manufactured articles in exchange, and if there are no restrictions on either side this must be the case; for the manufacturing country does not want the grain more than the agricultural country wants the manufactures. But it might happen that a country which had a very large internal and foreign trade would find it much cheaper to buy annually from grain-growing countries all the corn that is wanted to supply its deficient produce at home, than to attempt to supply the deficiency, or to add to the present stock of food, by cultivating very poor soils; and this, even if the grain-growing country should refuse to take a single article of manufactures. The only way, indeed, of actually testing the truth of such a case as this is by experiment; but if commerce were free from all restraint, the importation of grain would become a steady trade, the amount of which would be regulated by the condition of agriculture in the importing country. If the importing country had brought all the better soils into cultivation, the amount of foreign grain that could profitably be introduced would depend on the cost of production in the exporting country and on the cost of transport. Any improvement in the agriculture and internal communications of the importing country would tend to check importation by adding to the quantity of produce or cheapening the cost of production; increase of population would tend to increase importation. The limit of profitable corn cultivation in the importing country, under its actual circumstances, would be determined by the cost of production in the exporting country and the cost of transport. The agriculture of the importing country and of the exporting country would then both be free, so far as restrictions on their commerce are concerned, and the consequence of this competition would be favourable to agriculture in both, for the same reason that the importation of foreign manufactures into a manufacturing country i favourable to the industry of both countries: such importatio rages the industry of the foreign country, supplies the of the importing country, and stimulates its industry by tition and the contrast of the home and the foreign . The profits of the agriculturists in both countries be always the same or nearly the same as the average all profits in the two several countries; and the profits agriculturist of the importing country would not be d by the profits of the agriculturist of the exporting y, any more than the profits of any other class of persons be affected.

free development then of agriculture in a country re- the admission of foreign grain. If foreign grain is ab- y excluded, land is made to produce grain which would ter employed in some other way, as in pasturage or g. Corn thus becomes dear; and agriculture is en- ed or protected, as it is termed, to the injury of the f the people, and to its own injury also, for experience that those branches of industry receive most improve- which are neither restrained nor encouraged, but are ed to fair competition; in other words, industry to be roductive to a nation must have no other direction than he hope of profit will make individuals give it. If grain is not excluded, but admitted on paying certain he evil is much less than in the case of absolute exclu- rovided the duties are not high, and provided they are n; for nothing except a uniform duty can regulate the trade and give it that steadiness which is most parti- the interest of the agriculturist. A uniform duty, as ed with absolute exclusion, is equivalent, so far as as the foreign trade, to an addition to the productive of the soil of the importing country. If trade is he exporting country can send its grain whenever the f production and the cost of transport do not raise t-price of such grain above that of the grain raised importing country. A miraculous addition to the pro- powers of the soil of the importing country, or a sud- provement in its agriculture, without any corresponding in the exporting country, would at once lower the sell- ce of grain in the importing country, and diminish the from the exporting country. The effect is just the same he supply from the foreign country if a duty is laid on grain, for that duty will, in certain stages of the agri- of both countries, just make the difference that pre- he foreign grain from being sold in the importing coun- the same price as the native grain. In such case the grain cannot enter the country till the price of the na- in has risen by an amount equal to such fixed duty: the in which this rise operates is considered in a subsequent f this article. But there is this important difference be- the supposed cases of miraculous addition to the fertility soil or a sudden improvement in agriculture and the f a fixed duty, that in either of the first two cases the y has an increased supply of grain, in the other it has However, a fixed duty has the advantage of determining ecise terms on which foreign and native corn shall enter ompetition; and if the duty is moderate, and is con- d necessary for the purposes of revenue, some people that a country is not ill administered in which such a raised, though, if it is a manufacturing country rich in l, such a necessary tax is an obstacle to the full develop- of its manufacturing powers.

the duty is variable the trade cannot be steady, and con- ntly the price of corn will vary to every degree within ide limits, an assertion which is not a conjecture, but a ertained by experience. [Corn Trade, P. C.] If there ty, either variable or fixed, it gives to poor soils a value they would not have if the trade in corn were free; for mand for food calls poor soils into cultivation, and the of food is regulated by the cost of producing food on the ands, and food is consequently dear. The cost of pro- food on the rich lands is less, either owing to their ab- superior fertility, or the less labour and manure that quire, or owing to both causes. This superiority of ands over poor lands gives to them an increased value as objects of sale or objects of hire; the selling price of ands is raised, and the letting price is raised by a duty n; and other lands also acquire a value that they would herwise have.

rich country it matters little if a capitalist who wishes e land gives for it more than its value; such must be sult of the competition for land when the amount is l, and the desire and the power to purchase are con- y increasing. But the effect of a tax on foreign grain in a manufacturing country, when all the best soils are under cultivation, is directly to increase the value of land, and to add to the income of the landholder by making land capable of profitable production and of bearing a rent, which, without the tax, could not be profitably cultivated or give a rent to the owner. The price at which the cultivator must sell his grain in order to continue to cultivate includes his profit and the owner's rent, and the price is paid by him who consumes the grain.

It remains to consider the effect of taxation on the exporting and importing countries. If both are free from taxation, or if the taxation is equal in both, or nearly equal, no nation is well administered which does not allow the importation of grain to be as free as is consistent with raising the necessary amount of revenue. It is not however hereby admitted that a tax on the importation of foreign grain is like any other tax, for such a tax is doubly injurious; first, in raising the price of food; secondly, in impeding the full development of all branches of industry, agriculture included. But if the exporting and importing countries are unequally taxed, it might be said that the agriculturists cannot enter into fair competition, if we suppose their facilities for production are the same; for if the importing country is more highly taxed, the cost of producing grain is thereby increased, and the exporting country has an advantage over the importing country to the amount of the difference in taxation in the two countries. But agriculture is not the only branch of industry that is taxed in a highly taxed country; all other branches of industry are also highly taxed. There is nearly always a duty on all raw produce that is introduced into it for the purpose of supplying the manufactures, as well as a duty on grain; other taxes also affect directly and indirectly the cost of other manufactured articles. Now as taxes must by the supposition be raised in such a country, the question is—In what manner can they be raised with least injury to the general productive power of the nation? If a heavy tax is laid on any raw produce which is required in the country, whether it be corn which is required for bread, or cotton, or other raw articles which are required to supply the manufactories, the productive industry of the country will be checked; for the cost of production is increased, and therefore the selling price is increased; and increase of price checks consumption and excludes the producer of the article from those markets which he could command if he could offer his article at a lower price. Thus if any circumstances increase the cost of producing a given article, cotton-cloth for instance, in a manufacturing country, that country is unable to enter into fair competition in the markets of the world with other manufacturing countries which are not subject to such additional cost of production. If a manufacturing country is in such a condition that it does import foreign grain to some amount, notwithstanding heavy duties upon it, this is a sure indication that the importing country, in the present condition of its agriculture, has passed the limit of production which is profitable to the community. In like manner, if foreign manufactured articles of the same kind with those manufactured in this country should be imported to a considerable amount, notwithstanding the payment of heavy duties, it would at least be a clear indication that these branches of domestic industry could not supply the demand; and it might be that such branches of industry were wholly unprofitable to the community.

The operation of a tax on articles imported into a country seems to be this: the articles may either be articles of a kind which are not produced in the importing country, or which are produced there. If a tax or duty is laid upon articles not produced in the importing country, the direct effect is to raise the price of such articles and to diminish the consumption of them. The indirect effect is to diminish the demand of the exporting country for the goods which it receives from the importing country. If a tax or duty is laid upon articles imported from abroad, which are also produced in the importing country, the effect is to raise the price of all such articles, both those imported and those produced at home, and in this manner:—The producer does not immediately supply the public. Between the producer and the buyer there are the wholesale dealer and the retail dealer. The wholesale dealer regulates his purchases by the demand which he expects, and if he buys the foreign article he pays for it the price which the importer demands and the duty which the State demands. The whole mass of articles in the merchant's hands, foreign and native, must now be viewed as the produce of the importing country. Any tax which the State may have raised, directly or indirectly, on the native produce, raises its price;

and the tax which it imposes on the imported article raises the price of that article and also the price of the native product. The average price, therefore, at which the merchant can furnish the articles of foreign and domestic produce is raised, and the consumer must pay this price. The State derives no benefit from the tax or duty on the imported article beyond the bare amount of the tax; it may even be injured in other ways by the tax which the consumer is thus made to pay, for he could get the article cheaper if there were no tax, and his means of purchasing other things and paying other taxes are so far diminished. The effect on the producer of the domestic article, which comes into the market in competition with the foreign article, appears to be this:—The fact of the foreign article being introduced and sold to any considerable amount while there is a domestic article, shows either that the foreign article is wanted to supply the deficiency of the home production, or that it is preferred to it. In either case the producer of the domestic article can ask a higher price for it than he could if there were no duty on the imported article. The duty, therefore, gives something to the native producer, which he would not be able to get if there were no duty. This explanation applies to all articles of native produce which are not subject to an excise duty, if there are any such, and at least it applies to grain. Now the additional price which the producer of grain is enabled to get because there is an import duty on foreign grain does not ultimately go into his pocket: it goes to the owner of the land, whoever he may be, whether the occupier or another; for there is a competition among farmers for land to occupy, and they will offer rent up to that amount which will leave them the usual rate of profit, or even less: and if a man farms his own land, he will equally have the advantage of the tax; for he can either profitably farm his land when there is no duty on imported grain, or the duty on imported grain enables him to cultivate land which otherwise he could not cultivate, because the duty raises the price. The state raises a tax on the imported corn, which the consumer pays; and this tax enables the native producer of grain to demand of the consumer another sum of money, which to the consumer is just the same as the tax. All duties, therefore, on articles imported into a country, which are also the products of that country, and are not subject to an internal duty, are of the class called protective duties, whatever their amount may be. It is not the object of this article to discuss how far such protection may be equitably given to any class of producers or proprietors in a highly-taxed country. It is sufficient to show that all persons as consumers are injured by the tax, and that the only persons who receive any benefit from it are the owners of land. If the land is not so highly taxed in those countries in which there is a duty on imported grain as in other countries, the injustice of such a duty is the more flagrant. [LAND-TAX, P. C. and P. C. S.]

There is another mode of viewing the operation of a fixed duty upon corn (*Economist Newspaper*, Dec. 5, 1843). It is urged by those who maintain that such a duty cannot be other than a protective duty, that no supply of foreign corn can be obtained in the importing country until the price of corn in such country has risen high enough to pay the price of corn in the exporting country, with all the costs of transport, and the fixed duty also. It is further maintained, that the price of *all* the corn in the importing country must be so raised before foreign corn will come in; and consequently, that in any season when there is a deficiency of corn in the importing country, it is not merely the duty on the foreign grain imported that must be paid by the consumer, but he will have to pay an amount equal to the fixed duty on all the corn that is raised in the importing country for the consumption of a given period, for instance one year. Thus, if the consumption is 20,000,000 quarters, and the deficiency is 2,000,000 quarters, a fixed duty of 5*s*. per quarter on the 2,000,000 quarters will cause a rise of 5*s*. in the quarter on the 18,000,000 quarters also. Accordingly the State will get the duty on the 2,000,000 quarters, which the consumer will pay, and somebody else will get the 5*s*. per quarter on the 18,000,000, which the consumer also will have to pay. The truth of this proposition in its full extent may be questioned. The sum which the consumer will have to pay will certainly be more than the duty on the 2,000,000 quarters, but perhaps somewhat less than the 5*s*. per quarter on the remaining 18,000,000 quarters. For something must be allowed for the fact that all the 18,000,000 are not in the market for sale at once. Under a fixed duty, some of the 2,000,000 quarters of imported corn would be sold when the market price had risen to (say) 47*s*. the quarter; and an advance of a shilling or two in the price would induce other holders to sell t corn; but all holders might not do so. The market p might then turn, and others would dispose of their w housed grain while the market was falling. The home ma might then become depressed for a considerable period; during this period it might be so low as to render it unprofit to import foreign corn, even if the duty were only two three shillings. In this case then the consumers would no paying 5*s*. per quarter higher than they would have don the trade were free. Something also must be allowed for disposition of merchants to speculate; and both they and producers are liable to be acted upon by the apprehension falling markets, when, as sometimes happens, a real panic t place, and prices are depressed beyond all reasonable ca lation. We should be disposed, therefore, to qualify assertion of the 'Economist' by the conclusion that, in importing country, with a fixed duty of 5*s*., the average p of corn, in a series years, will be somewhere about 5 quarter higher than it would have been if the trade had b free; and perhaps this is all which the writer intended stri to contend for. It may perchance turn out that the consu will have to pay more than 5*s*. per quarter on the 18,000, quarters, or on some part of it; but it seems hardly saf assert that he will have to pay exactly 5*s*., neither less more.

A chimerical difficulty is sometimes raised of this kind:- a country does not produce all the grain that it requires, it is dependent for any considerable amount on foreign tra it may suffer from scarcity in some seasons, and in time war might be in danger of famine. As to the scarcity, perience shows that no dependence can be placed on a regu foreign supply, unless there is a regular trade in corn, that a trade into which a man can enter as he would into any ot well regulated trade. If a scarcity should ever happen in importing country, it will be remedied by the stores of gr on hand that are supplied by a steady trade. If the trad unsteady and uncertain, the scarcity may be supplied or may not: but it must be supplied at a higher cost, and so times it may be difficult to get a supply at all. Rome, b under the republic and the empire, was in part supplied w foreign grain, but the supply was uncertain, for it was not furnished in the way of regular trade, but sometimes cal for as a forced contribution, sometimes accepted as a gift, it was often purchased by the State, for the purpose of dis bution among the poor, either gratis or at a low price. Italy imported grain largely under the early emperors. T scarcity with which Rome was sometimes threatened was owing to the grain coming from foreign parts, but to the that there was not a steady trade founded on a regular mand by a body of persons able to pay for it. If a gov ment shall regulate or attempt to regulate the foreign trad scales of duties varying according to any law that the wis of a legislature may select, the result will be the same, irregularity in price and sometimes scarcity. It makes difference whether the State imports directly or regulate importation of its subjects by a capricious rule. The importation of the State, if well managed, would obviou the safer plan of the two. What is here said of the R system applies only to the importation of foreign grain the city of Rome. The necessity which existed for th portation is a question that can only be discussed wi question of cultivation in ancient Italy, and the gratuito tribution of grain at Rome. Dureau de la Malle has valuable remarks on this subject (*Economie Politiq Romains*); but we do not assent to all his conclusions.

The fear that war might shut out the supplies of which are brought into a country under a regular com cannot enter into the minds of those who view the qu without prejudice. War does not and cannot destr trade; it may impede it and render it difficult, but trad existed in all wars. The supposition that a rich manuf ing country which abounds in all the useful produc industry cannot under any circumstances buy corn out of superfluity, is a proposition which should be proved, not c futed. It belongs to those who maintain this proposition give reasonable grounds for its truth.

For some remarks in this article the writer is indebted Ganilh, *Dictionnaire d' Economie Politique*, art. 'Agric ture.

AGRICULTURE, STATISTICS OF. In several cou tries of Europe there is a department of government organi either for collecting the statistics of agriculture or superinte ing institutions which have immediate relation to that bra of industry. In France these duties devolve upon a department of the Minister of Commerce and Agriculture. The management of the royal flocks, veterinary schools, and the royal studs; the distribution of premiums in agriculture; the organization and presidency of the superior and special councils of agriculture, are comprised in the duties of this ministerial department. The councils-general of agriculture, &c. in each department of France collect the agricultural statistics from each commune; and the quantity of land sown with each description of grain, the produce, and the quantity of live stock for the whole of the kingdom, are accurately known and published by the Minister of Commerce and Agriculture. In Belgium these facts are ascertained periodically, but not every year. In the United States of North America, at the decennial census, an attempt is made to ascertain the number of each description of live stock, including poultry; the produce of cereal grains, and of various crops; the quantity of dairy, orchard, and garden produce, &c., in each State. There are twenty-nine heads of this branch of inquiry. The only countries in Europe which do not possess statistical accounts of their agriculture founded on official documents are England and the Netherlands. In England the quantities of corn and grain sold in nearly three hundred market-towns, the quantities imported and exported, and the quantities shipped coastways, are accurately known, but no steps are taken by any department of the government to ascertain the quantities produced. On the same principle that a census of the population of a country is useful, it must be useful to have an account of its productive resources. The absence of official information is supplied by estimates of a conjectural character, founded at best only on local and partial observation. In France it is positively ascertained that the average produce of wheat for the whole kingdom is under fourteen bushels per acre. In England it is known that the maximum produce of wheat per acre is about forty bushels, and that the minimum is about twenty bushels. The usual conjecture is that the average produce of the kingdom in years of fair crops is about twenty-eight bushels, but the total superficies sown with wheat or any other grain, and the total quantity of the produce, are matters simply of conjecture. The only statement the public or even the government are in possession of in respect to the quantity of land cultivated and uncultivated, and of land incapable of producing grain or hay, in Great Britain, rests upon the authority of private inquiry made by one person, Mr. Couling, a civil engineer and surveyor, who gave the details to the parliamentary committee on emigration in 1827, now seventeen years ago. As there is an account published weekly in the 'London Gazette' of the quantity of each description of grain sold in nearly three hundred market-towns in England, with the average prices, and the quantity of foreign corn and grain imported is also officially published, it would be putting into the hands of the community very important elements of calculation in reference to the supply of food, if they could also learn after each harvest what had been the breadth of land under cultivation for each species of produce respectively, and the amount of produce harvested. The result could not fail to be felt in greater steadiness of price, which is particularly desirable for the interests of the tenant farmer, and also highly advantageous to the public. For example, the harvest of 1837 was deficient to so great a degree, that before the produce of 1838 was secured the great superabundance of the two preceding harvests was all consumed, and the stock of grain was more nearly exhausted than it was ever known to have been in modern times. A reasonable advance of price would have checked consumption, which, as regards wheat, had been going on with unwonted profusion, but in August, September, and October, 1837, the markets fell from 60*s*. 1*d*. to 51*s*. per quarter, and it was not until the middle of the following May that the average was again as high as it had been just before the harvest of 1837. By the third week in August, 1838, the average had risen to upwards of 73*s*., and wheat was admissible at the lowest rate of duty. The buyers consequently resorted suddenly to nearly every corn-market in Europe, and prices, aided by a wild spirit of speculation, which subsequently was productive of great loss to importers, rose enormously. It is contended that these losses and the fluctuation of prices would not have occurred if the produce of the harvest of 1837 had been more accurately known. (*On the Collection of the Statistics of Agriculture*, by G. R. Porter, Esq., of the Board of Trade.) The probable operation which statistical facts officially collected would have upon agricultural improvement are thus adverted to by Mr. Porter:—'It has been stated that if all England were as well cultivated as the counties of Northumberland and Lincoln, it would produce more than double the quantity that is now obtained. . . . . If the cultivator of land where agricultural knowledge is the least advanced, could be brought to know, upon evidence that could not admit of doubt, that the farmer of Northumberland or Lincolnshire procured, from land of fertility not superior to his own, larger and more profitable crops than he is in the habit of raising, is it likely that he would be contented with his inferiority?' In 1836 the late Lord Sydenham, while president of the Board of Trade, in order to test the probability of success that might result from a more extended attempt, caused circular letters containing fifty-two simple but comprehensive queries relating to agriculture to be sent to each clergyman in the one hundred and twenty-six parishes of Bedfordshire. Out of this number only 27, or about one in five, replied, and further inquiry was abandoned. The tithe commissioners make returns of the crops in all parishes, but they do not do so simultaneously. There is however no insuperable difficulty in collecting the national statistics of agriculture, whenever government thinks fit to undertake such a duty. On the 18th of April, 1844, on a motion in the House of Commons for an address to the queen praying for the establishment of some method of collecting agricultural statistics, the vice-president of the Board of Trade, on the part of the government, concurred in the object of the motion, but from various causes he declined at that time giving the motion his support. The yearly expense of the inquiry would be from 20,000*l*. to 30,000*l*.; and probably not a long period will elapse before the appropriate machinery will be in operation. In this way can government advance the interests of agriculture and of the public at the same time. In a country like England, which abounds with men of rank, wealth, and intelligence, who engage in scientific agriculture as a favourite pursuit, it is quite unnecessary for the government to assume the superintendence of matters which relate to practical agriculture; but this may be done with propriety in other countries, which are placed in different circumstances.

AIR BEDS AND CUSHIONS. The mechanical application of common air, in respect to its pressure or elasticity, has been greatly extended within the last few years. The pressure of fourteen or fifteen pounds on the square inch, which the weight of the superincumbent atmosphere gives to the air at the surface of the earth, is a mechanical agent which, under certain arrangements, becomes a substitute for powers of a very different kind.

Provided a mass of air can be confined within a given receptacle, and that receptacle be of an elastic or yielding character, the air assumes many of the qualities of a soft stuffing or padding, when its quantity is small compared with the size of its envelope; but when the quantity is as great as can be introduced without bursting the envelope, the air becomes in fact nearly equivalent to a solid body. So long as the means were wanting for conveniently making air-tight cloth vessels, this principle was slenderly applied; but the use of caoutchouc or India-rubber, as a glutinous varnish, has developed many ingenious contrivances for this object.

Almost any textile fabric may be rendered impervious both to air and water by the use of some one or more of the caoutchouc compositions [WATER-PROOF CLOTH AND LEATHER, P. C.]; and when a bag has been made of such material, rendered also air-tight by somewhat similar means at the seams, air may be passed into it as a substitute for more solid materials. In practice there are some very neat arrangements adopted in effecting this. Temporary air-seats or cushions are made by forming a bag of air-tight cloth, perfectly enclosed at every part except one corner, where is inserted a small tube and stop-cock, capable of admitting or preventing communication from the interior to the exterior. The cock being opened, and the tube applied to the mouth, air is blown into the cushion, until it expands to the desired degree of fulness; the cock is then closed, and the air remains imprisoned. In this state the cushion is of a more equable kind than any one stuffed with solid materials; and if the envelope be well made, it will retain its efficacy for a long time. When not in use, such a cushion can have the air expressed from it, and may then be folded up into a small space.

It is obvious that seats, cushions, pillows, and beds of various kinds, having a similar object in view in respect to softness, fulness, and elasticity, may be made by similar means. When the quantity of air included in an envelope is greatly increased, it may be made the means of producing actual pressure in a more equable way than by any solid bodies. Thus, an air-tight bandage was invented a few years ago, of which many persons had an opportunity at the time of seeing a specimen at the Polytechnic Institution. The object of this arrangement is to form a wrapper to an arm or limb under surgical treatment. There is a bandage with straps, capable of being conveniently tied round the arm; and when so tied, air is breathed into an air-tight envelope to the bandage, through a small tube provided with a pipe: by increasing or lessening the quantity of air impelled, the pressure of the bandage on the limb may be made so small as to be scarcely perceptible, or may be even painfully close, and it will be equable in different parts.

About four years ago Mr. Walton took out a patent for certain modifications in the mode of preparing air-bags for beds and similar purposes. The plan seems as if it must necessarily be a costly one, and is thus described.—There are first made a number of globular air-vessels of India-rubber, in one of two modes. In the first mode, a metallic receiver is charged with compressed air by means of a condensing syringe; at the upper part of this receiver there is a pipe furnished with a stop-cock; a jointed lever, countersunk on the under side, is brought down upon the pipe, a small aperture being made through the lever opposite the centre of the pipe. India-rubber bottles are cut in half and soaked in water at 100° Fahr., and afterwards in cold to facilitate their separation into laminæ; the thin sheets thus obtained are placed over the pipe and held down upon it by the lever. Upon then turning the stop-cock, the condensed air pushes the India-rubber up through the aperture in the lever, expanding it into a ball; in other words, the force of the compressed air both makes the ball and fills it by the same action. When brought to the proper size and strength for the required purpose, the ball is tied round with thread close to the lever, the superfluous edges are cut off, and the joint secured with India-rubber cement. The second mode of making and filling the air-balls consists in the use of a pair of hemispherical cups hinged together, and both connected by tubes with a metal receiver furnished with a stop-cock. A piece of thin sheet India-rubber is stretched over each hemispherical cup; and the air being then extracted from within, the external air forces the thin membrane to conform to the interior of the cup. The two cups of India-rubber are then joined together, forming a ball. The balls, made and filled by either of these methods, are connected together, either externally, or by being enclosed within an external covering, forming a sheet of balls. Many such sheets may be laid one upon another, enclosed in an outer case, to form a bed or mattress of any thickness. The object of this complicated plan is stated to be, the limitation of an accidental injury or rupture to one small air-vessel.

AIR-VESSELS are the parts constituting a piece of machinery invented by Mr. Cubit to serve the purpose of a *fly* in regulating the motion of a wheel which, as a prison discipline, is turned by men.

Several vessels are employed, each of which is cylindrical, and consists, like a pair of bellows, of an upper and lower board, with sides of leather: the vessel has only one aperture, and the lower board is made fast to the floor, while the upper one is capable of being moved up and down by its connection with a crank which turns on the axle of the wheel. A sliding plate having holes pierced in it is capable, by wheel-work, of moving before the aperture, so as to diminish the latter to any required extent, and is connected with the governing balls of the machinery.

Thus, when the velocity becomes too great, the divergence of the balls causes the sliding-plate to pass more or less over the aperture and contract its dimensions; by which means less air enters into and is expelled from the vessel, and a resistance is created which diminishes the speed. Or, in the event of the velocity becoming too small, the balls descend, and the sliding-plate is drawn off from the aperture, by which means the air enters and issues more freely, and thus the resistance to the motion of the machine is diminished. (Transactions of the Society of Arts for 1827.)

An apparatus of the same or a like kind might be employed for other purposes: for example, in lowering heavy goods from a wharf, or from the upper part of a warehouse; and an ingenious machine, in which the resistance was produced by the passage of water or oil through an orifice, is or was in use at some of the warehouses belonging to the East India Company. It consisted of a cast-iron box immoveably attached to the ground, or floor, its interior forming the concave surfaces of two hollow cylinders, in vertical positions and of equal heights, separated from each other by a portion of the material. The two cylinders were capable of holding about a g
and they communicated with each other by open
the top and bottom of the material between th
larger cylinder was a solid piston which ascen
scended in consequence of its connection with a
axle of the wheel by which, in general, goods w
to the place. In the middle of the smaller one
plate capable of being turned about an axis in th
a diameter so as to allow a communication of a
magnitude to be made between the upper and
the cylinder.

In use, the two cylinders were nearly filled
oil; and, the piston rising and falling alternatel
in descending turned, by the crane-rope, the axle
the resistance created by the passage of the flui
communications between the two cylinders and
opening at the circular plate, prevented them fro
too rapidly: at the same time the risk of the acci
a simple brake is liable was avoided.

AIX EN PROVENCE. In the fresh-wat
this locality many fossil insects have been dete
chison.)

AIZA'NI or AZA'NI, Antiquities of, (Αἰζ
or according to its modern name, Tchafter-His
Asia Minor, in the antient province of Phrygi
hours' journey from Kutahia. It is mention
(p. 576) as one of the places of Phrygia Epict
name of Azani; other authorities write the
(Stephan. Byzant. v. ’Αζανοί). Nothing is kn
tory, and its existence had been almost forgotten
when, owing to its having been visited by
artists, the numerous remains of extensive edific
it archæological interest in the history of archit
St. Asaph was the first who communicated an
respecting these ruins (1825), which were visi
same time by Count de Laborde, and somew
Major Keppel; but it is to Charles Texier,
who, just after completing his studies in Italy
by the French government to Asia Minor, ab
we are indebted for an accurate artistical descri

The first building that attracts notice on ap
place is a temple, which, being raised on
eminence, forms, like the Parthenon of Athens,
object from a distance, and commands the res
Instead however of being, like the Athenian
natural rock, enclosed on its summit with walls,
quite unshaped, and having its buildings placed
larly without any regard to symmetry of general
the eminence upon which this temple at
forms an elevated platform or terrace cut o
and perfectly regular in its plan, which is a
and nearly a square, its measurements being 5
lish) on its north and south sides, and 480 o
west. From the remains of walls at the nor
it is conjectured that the platform of the ter
peribolus or court to the temple, enclosed o
sides, while the east one (corresponding with
end of the temple) was left open, and on that si
the terrace was decorated architecturally throug
extent by a series of twenty-two arches with pil
them, *i.e.* eleven on each side of the central
(100 feet wide), forming the ascent to the
Thus the terrace here formed a magnificent sub
together with the temple, must have produced
striking and imposing effect. The temple itself
in the centre of the peribolus or platform, conseq
facing the ascent up to it. This edifice, which
inscriptions found among the ruins to have bee
Jupiter of Aizani, is now more than half destroy
remaining than the columns of the north and
the corresponding portions of the cella; yet
affords sufficient data for determining with acc
ticulars in regard to its plan and the peculiar c
order. Referring to the article TEMPLE in the '
pædia' for an explanation of the respective t
briefly describe it technically as being Ionic, o
dodipteral with fifteen columns on its flanks, the
corresponding with the cut which is there give
an example of a pseudodipteral plan. Its gene
do not exceed 104 feet by 53, or including the
which it is raised, 121 by 72, and therefore in poin
it is much smaller than some of the structures
'Table' of them in the 'Penny Cyclopædia,

y larger than some of the most celebrated of them—
e, than the Maison Carrée at Nismes, which is only
feet. The whole is constructed of white marble,
olumns, 31 feet high, are each of them wrought out
e block; but what gives such interest to this monu-
that it affords a very remarkable example of the
Ionic, decidedly differing, at least in its entablature,
y specimens heretofore edited. The columns have
liar Asiatic Ionic base, but are not otherwise remark-
cept for the singularity of there being a small vase or
ed in the upper part of each channel of the fluting:
e of course so very diminutive that they could hardly
een distinguishable at that height, and therefore were
y intended only to produce the effect of an enriched
o or uniting to the capital with the fluting continued
h it. Far more remarkable is the entablature, both for
oportions and decorations: the architrave, which is
d into three facias with carved bead mouldings, is
erably deeper than the frieze, which excess is caused
unusual breadth of its coping, consisting of a large
nd cavetto above it, both enriched. The frieze is still
markable—even unique in its design, which is such as
er it most difficult to describe: large upright acanthus-
laced singly at intervals after the manner of triglyphs,
nd beneath a sort of consoles formed by the junction
scroll-like volutes meeting each other in front like
the angle of a Corinthian capital, to which they bear
rong resemblance; therefore taken with the acanthus-
neath them, they give the frieze a certain Corin-
of character. The cornice again differs both from
d Asiatic-Greek examples of the order, inasmuch as,
u to the dentils of the latter, it has small modillions:
a is narrow; the cymatium above it, on the contrary,
, and enriched with a flower pattern. Taken alto-
is specimen of the Ionic style is an interesting and
cquisition to our studies of the antient orders, and
another striking proof of the freedom and diversity
h they were treated, wherefore this account of it
cceptable, more especially as this is almost the first
et been given in any English publication. Beneath
s a subterraneous chamber or crypt, 52 feet by 29 feet
with a vaulted ceiling; light was admitted into it by
abat-jours, or apertures in the pavement of the colon-
t the walls of the cella, and the steps leading to it
in the posticum. Several columns now lying on the
within the peribolus indicate that that enclosure must
n adorned with them, since they evidently do not
to the temple itself, being not much above half the
he others, and besides the lower part of their flutings
ed.

this temple the chief other monuments discovered at
re a theatre, stadium, and gymnasium: the first of
hich is in better preservation than almost any other
tructure of its kind, is 185 feet in its greatest diame-
the spectatory had sixteen rows of marble seats, but
the upper or second tier are nearly all destroyed: the
however of that tier, or the wall of the præcinction
g it from the lower one [THEATRE, P. C., p. 294], is
greater part remaining, and shows one peculiarity,
niches placed at intervals in pairs, of which there
number 24. The orchestra forms more than a semi-
th a radius of 66 feet. The scena was decorated with
of coupled Ionic columns, but these have fallen down,
lying with a mass of other ruins and fragments in the
.

tadium, which is a little to the south-east of the
measures 725 feet in its extreme length and 152 in
e breadth. There were two pulvinaria or loggias,
the magistrates, the other for the directors of the
nd ten rows of seats along each side, capable of
lding between 12,000 and 13,000 persons.

gymnasium, or what is supposed to have been such,
h is situated to the south of the peribolus of the
ple, little more remains than a Doric colonnade
upwards of 200 feet, whose pillars are all of white
d of a single piece. To the north-west of the
also some ruins of what is supposed to have been a
The river Rhyndacus, which passed through the
ossed by two bridges of white marble, each con-
five semicircular arches. Both are remaining, as
apets of the quays along the river, which, like the
constructed of white marble and ornamented with
There are besides many tombs, whose doors and
portals (represented in Texier's work) afford valuable architectural hints and studies.

ALA'NI (Ἀλάνοι) is the collective name of different nomadic nations that lived in the countries north of the Euxine and the Caspian, and may be divided into European and Asiatic Alani. They became early known to the Romans, if the Alani mentioned by Suetonius (*Domitian*, 2) were the same as those of whom we speak, and not the Albani, who lived in the southern part of the present country of Daghistán and in Shirwán, and are mentioned by Strabo (p. 499, Cas.), Ptolemy, and many other antient writers. Ammianus Marcellinus (xxxi. 2) says that the Alani were the same as the antient Massagetae, which is probable if we take the name in its collective meaning, for the same author says (xxii. 19) that the Alani lived north of the Maeotis, a country of which the Massagetae, in all probability, have never occupied any part. The name appears to have originally belonged to a Caucasian tribe which lived between the chief range of the Caucasus and the Portae Caspiae, now the Iron Gate, near Derbend, and as far north as the great steppe between the Kuma and the Volga; and it is probably this tribe which subdued the neighbouring nations, and to which we must refer the words of Ammianus Marcellinus (xxxi. 2), who gives the best description of the Alani; he says that the nobles among them were a very handsome set of men, with fair hair, and eyes of a terrible expression. The Alani showed some traces of civilization, but they liked warfare above all other occupations, and made frequent incursions into the Roman provinces. Their horses were excellent and very swift, and the armour and arms of the men were light, and well suited for a predatory mode of warfare. The Romans fought many battles with them, but not always to their advantage. The Emperor Gordian was defeated by them near Philippopolis, A.D. 242; and they took a decisive part in the victory which they and the Goths obtained in A.D. 378, near Adrianople, over the Emperor Valens, who was killed in or after the battle. (Amm. Marcell. xxxi. 13.) In A.D. 406 and 407 the Alani became still more conspicuous by invading Gaul with the Vandals, Suevi, Burgundians, and other barbarians. After having lived some years in that country they joined the West Goths and Vandals for the purpose of invading Spain, which soon yielded to their arms (A.D. 411). The Alani now settled in Lusitania and the province of Carthagena, and lived for some time under their kings till they quarrelled with the West Goths, whose king, Wallia, defeated them in A.D. 440 in a pitched battle, where the Alanian king Atax lost his life. Upon this the Alani joined the Vandals, and shared their fate in Spain as well as in Africa. After A.D. 440 they ceased to be an independent nation. The later part of their history can only be traced in the dry and short chronicles of Prosper, Idatius, and Isidorus. Part of the Alani did not join the Spanish expedition in A.D. 411, but remained in Gaul under their king Goar. In A.D. 440 Aëtius, the Roman governor of Gaul, allotted them settlements in the environs of Valence, with a view of making them serve as a barrier against the Goths. Their king Sambida, or Sangipanus, was intrusted by Aëtius with the command of Orléans, which Attila was besieging in A.D. 451; and it appears that he was bribed by the Hunnic king, to whom he would have surrendered the town if he had not been closely watched by the Romans and the West Goths, who trusted him so little, that in the great battle on the Campi Catalaunici they put the Alani between their most faithful troops, and thus compelled them to fight. The second expedition of Attila into Gaul, which seems to be an historical fact, although Jornandes is the sole author who mentions it, was undertaken under the pretext of subduing those Alani of Valence. Gregorius Turonensis states (*Hist. Franc.* ii. 7) that they were deprived of their independence by Thorismund, king of the West Goths. The name of the Alani occurs in all the later historians, among whom, besides those quoted above, Zosimus, Procopius (in his 'Bellum Gothicum,' as well as in the 'Bellum Vandalicum'), and Priscus, are the best sources. All the passages of the antient writers referring to this nation are collected in Stritter, 'Memoriae Populorum.'

For many centuries after the destruction of the Alani in Spain and Gaul their name occurs in the later Byzantine writers, and we have many modern maps in which the Alani are put down as inhabiting the tract between Derbend and the Kuma. Eichwald, a most competent writer on these matters, shows that this arises from a mistake, the Byzantines having confounded the Alani with the Albani, a Turkish tribe, with which the Greek emperors were engaged in perpetual wars.

The Alani were undoubtedly a Circassian nation, and as the social state of the Caucasian tribes seems to be nearly the same as it was fourteen hundred years ago, a nearer acquaintance with these people will enable the student to form a pretty correct idea of the state of civilization of many of the barbarians who overthrew the Roman empire. The feudal system is a very old institution in Caucasia.

(Eichwald, *Alte Geographie des Kaspischen Meeres;* Mascou, *Hist. of the Antient Germans*, translated by Lediard; Papencordt, *Geschichte der Vandalen.*)

ALARIC II. (ALARI′CUS), king of the West Goths, succeeded his father Eudes in A.D. 484. Gothia, the then name of the West Gothic kingdom, had been considerably enlarged by Eudes, and extended over Hispania Tarraconensis and Baetica, and in Gaul as far as the Loire and the Rhône, by which rivers it was separated from the kingdoms of the Franks, the Burgundians, and the East Goths, who were masters of the province. If we can trust Isidorus, Alaric had spent his youth in idleness and luxury, though the truth seems to be that, preferring a peaceful reign to war, which in the eyes of the Goths was the only occupation worthy of kings, he incurred that reproach because he was not fond of bloodshed. He was an Arian, as most of his countrymen were; but he was a very tolerant man, as we see from the acts of the Council of Agde, which was held in A.D. 506, and by which many privileges were granted to the orthodox Catholics. His toleration was the cause of his ruin. Clovis, king of the Franks, having overthrown the last remnants of the Roman power in Gaul, coveted the fine countries west of the Loire; and there being still many Catholics in Gothia who were dissatisfied with their king because he was merely tolerant towards the Catholics, and did not adopt the Catholic faith, he declared war against Alaric. The old East Gothic king, Theodoric the Great, whose daughter Theudigotha was the wife of Alaric, foresaw the war, and tried to prevent it by conciliatory means: the letters which he wrote to that effect to the kings of the Franks, the West Goths, and the Burgundians, are given by Cassiodorus; but his endeavours were in vain, and the war broke out in A.D. 507. For twenty-three years the Goths had had no war of consequence (for that they should have had no feuds with their neighbours the Vandals and Suevi is not likely), and the warlike habits of his subjects were rather relaxed; while the Franks scarcely knew what peace was, and improved their discipline in continual contests with their neighbours. When the West Goths and Franks came to settle their difference in a pitched battle near Vouglé, in the environs of Poitiers, the result proved fatal to king Alaric, whose army was entirely defeated. Alaric fled, but was overtaken and killed. Gregorius Turonensis mentions his death in a few words, too vague to allow us to conclude that it was Clovis who slew his rival with his own hand, as several modern writers say. The Goths made a halt at Narbonne, and, unfortunately for them, quarrelled among themselves about the choice of a new king. One part of them chose Gesalic, or Gisolec, the elder but bastard son of Alaric; and another Amalaric, the lawful son of Alaric and Theudigotha. This prince being too young to rule, the regency over the West Gothic kingdom was intrusted to his grandfather, the East Gothic king Theodoric, who drove Gesalic out, and compelled the Franks to restore their conquests. A proof that Alaric was peaceful because he appreciated the blessings of peace, and that he was able to consolidate that peace by a regular system of legislation, is the code called BREVIARIUM ALARICIANUM, P. C. S.

(Cassiodorus, *Variar.* 3, ep. 1, &c.; Gregorius Turonensis, ii. 36; Procopius, *De Bell. Goth.* ii. 12; Jornandes, *De Reb. Goth.* p. 129, ed. Lindenbrog; Isidorus, *Chron. Goth.* ad an. erae 522; Mascou, *Hist. of the Antient Germans*, translated by Lediard; Aschbach, *Geschichte der Westgothen.*)

ALBA, *the Province of*, an administrative division of the Sardinian States, is bounded on the east by Acqui and Alessandria, north by Asti and Torino, west by Saluzzo, and south by Mondovi. The country is hilly, and it is intersected from south to north by the Tanaro, an affluent of the Po. The products are wine, corn, pulse, fruit, and silk. Truffles are dug up in many places, and are an article of export. A considerable quantity of horned cattle is bred in the country. The area of the province of Alba is about 300 square miles, and the population is 105,700 inhabitants. It is divided into eleven ‘mandamenti’ or districts, and seventy-seven communes. The head town, Alba, a bishop's see, is situated in a fertile plain near the banks of the Tanaro, and contains 8000 inhabitants. It has a cathedral, built in the fifteenth ce and several other churches; an hospital, a royal coll clerical seminary, a literary and philharmonic academy several private collections of antient medals and othe quities which have been found in the neighbourhood. was a town of the Statielli, and it is said to have been by Pompeius Strabo, the father of Pompeius Magnus, sequence of which it was called Alba Pompeia. T peror Pertinax was born at Villa Martis near Alba memorials of the splendid residence which he built have been found in a farm called La Martinenga, the which has published an interesting account of th ‘Della Villa di Marte, Casa, e Lari dell’ Imperatore Pertinace ne’ Celto-Liguri-Tanarei; Illustrazione de Vincenzo Deabbate Patrizio d’ Alba Pompea,’ 4t 1818. A sepulchral altar of marble, with a frieze workmanship, was found in the bed of the Tanaro bearing the names of Caius Cornelius Germanus quaestor, duumvir, and sacerdos, and of his wife This monument has been illustrated by the antiquari Vernazza: ‘Germani et Marcellæ Ara Sepulcralis Con Illustrata.’ The monument is deposited in the co town-house. In the middle ages Alba was one of cipal towns of the marquisate of Monferrato. It wa to the dominions of the house of Savoy by the treat rasco in 1631. The learned Vida was many years Alba.

The other towns of the province are: 1, Brà or considerable place, of 10,000 inhabitants, in a district ing with corn, wine, fruit, cattle, and silk. Brà is from Polenza, built on the site of the antient Pollentia, Stilicho defeated the Goths, A.D. 403, and for a time Italy; 2, Sommariva del Bosco, a town of about 5000 bitants; 3, Canale, with about 4000, and other smaller

(Casalis, *Dizionario Geografico, Statistico, Comme* *degli Stati di S. M. il Ré di Sardegna;* Denina, *dell’ alta Italia; Calendario Sardo;* Serristori, *dell’ Italia.*)

ALBATEGNIUS (Astronomer). D'Herbelot cal Mohammed Ben Giaber, but Mr. Gayangos, who has more particulars of him than any one else (in the *Biogr.* of the Society for D. U. K.), names him Mohamme Jábir Ibn Senán Abú Abdillah. The term Albategnius Latinized form of El Batani, or Al Bateni, from Baten sopotamia, where he was born. He lived in parts of th and tenth centuries, beginning his astronomical obser in A.D. 877, and continuing them till his death in 92 generally resided at Rakkah (Aracta) or at Bagdad. H ings comprise abridgments of Ptolemy and Archimede comments; a work on astronomy, chronology, and geog a treatise on the rising of the constellations and variou points of astronomy; an elementary treatise on astro and one on astrology; with minor works. The treatise rising of the constellations (Lalande *in verb.*, Delamb translated from Arabic by one Plato Tiburtinus, but was detected by Halley). This translation was twice first as ‘Alfragani Rudimenta Astronomiæ, et Albategni de Motu Stellarum . . . cum Joh. de Regiomonte Orati troductoria . . . Norimbergæ, 1537,’ 4to.: next as ‘Al de Scientiâ Stellarum Liber, cum aliquot Additionibus giomontani . . . edidit Bernardinus Ugulottus, Bononiæ, 4to. Both editions leave out the tables which the bo written to explain, from which it is difficult to form accurate idea of the labours of Albategnius; but th enough to show that he was an astronomer of great and a very independent turn of thought: it is likely t was among the first, if not the very first, to find out t data used by Ptolemy required correction. He seems had no other guide: the Indian numerals are not found work, so that it is difficult to suppose that he deriv astronomy from that quarter.

He was the first who rejected the chords, and sub sines in their place, and of this apparently trifling im ment we are reaping the fruits to this day: he also used sines and (though without seeing the full extent of their tangents. He determined the obliquity of the eclipti the parallactic instrument as described by Ptolemy, manner that his observation, compared with those of o gives 0″·505 for the annual diminution of that elemen modern tables give it, at this time, 0″·475. His sine trigonometry, even in his own hands, quite a new app and a new power; and he had a much greater nu methods in spherical trigonometry than the Greeks.

that he invented these himself, for he distinctly imself to be the first who abandoned the chords: for finding the third side from two sides and the ngle, and the angles from the sides, must be attri- him; with great simplifications in the doctrine of led triangles. He determined the length of the tro- r, making it only 2m. 26s. too short: a result much ct than that of Ptolemy. The same may be said of minations of the precession of the equinoxes, of the the solar apogee, and of the excentricity of the earth's Looking at his determinations of the two latter, and that he does not infer that they are changeable ele- we are left to conclude that he attributed the difference himself and Ptolemy to errors of observation. But by the research of Albategnius that succeeding astro- were able to infer the variability in question, and as ly reason for his not inferring it was his well-grounded of confidence in Ptolemy's results, he has the merit of overy. Several writers have affirmed that he did e it: but incorrectly. The changes which he made the theory of Ptolemy are slight: and in his planetary he has very little success. For a fuller account of his e Delambre, 'Hist. de l'Astron. Moyenne,' p. 10-62. rned and excellent historian, who rarely lets an author t stripping a few leaves from his crown, shows Alba- great advantage in comparison with Ptolemy as e, and with his European follower Regiomontanus nt: and the subject of our article may fairly take he greatest of the Arabic school, which forms the n that of the Greeks and our own.

iGA, *the Province of*, an administrative [illegible] States, forming part of the Duchy of Genoa, [illegible] the southern slope of the Maritime Alps, which e blended with the Apennines, [illegible] ast of the Mediterranean [illegible]. Its dth is about [illegible] miles. It is [illegible] the province of Savona, [illegible] lia, and on the [illegible] M[illegible]

The country is [illegible] lps which run [illegible] alleys through which [illegible] e only river that does [illegible] which rising in the [illegible] e of the high [illegible] es its [illegible] long valley of La Pieve [illegible] nts, and afterwards [illegible] a four miles above [illegible] d then joins the sea [illegible]

The [illegible] of the A[illegible]

Formerly the river [illegible] re a Roman bridge is still seen [illegible] are now [illegible] in sand [illegible] ia or Centa [illegible] plain and the town of Albenga [illegible] ie, are long since [illegible] the king of Sardinia [illegible] e the town, which was thus [illegible] so filled up with sea-sand [illegible] summer infected the atmosphere [illegible] almost entirely [illegible] The plain of Albenga [illegible] ritory, is [illegible] hemp, wine, oil, and fruit [illegible] country, [illegible] provinces of Oneglia and [illegible] inhabitants of the [illegible] of Albenga [illegible] lbenga, the head town of the [illegible] a mile from the sea-coast [illegible] urches, some [illegible] 0 inhabitants, with [illegible] al Roman [illegible] s a baptistery [illegible] town existed in the [illegible] mans, and it [illegible], who fought [illegible] subdued by the Proconsul [illegible] xl. 25-29. A[illegible] culus, who [illegible] was defeated and killed [illegible] gauta.) Several Roman [illegible] ttered about the town. [illegible]

Albenga governed itself as a municipal town under the supremacy of Genoa. The other towns of the province are: 1, Alassio, a town on the coast, south-west of Albenga; it has a collegiate church, a communal college, and 6300 inhabitants, mostly addicted to seafaring pursuits. At the end of the last century there were seventy merchant-brigs belonging to this place; they are now reduced to twenty. Boats from Alassio carry on the tunny and herring fishery on the coast of Sardinia, and the tunny fishery on that of Tunis. It is chiefly from Alassio that the inland country of Piedmont is supplied with sea-fish, both fresh and pickled. The sailors from Alassio and the neighbouring town of Laigueglia (2000 inhabitants) are among the best and most trustworthy in the Mediterranean. Many of them emigrate to America, and especially to Buenos Ayres, whilst others have founded respectable mercantile houses in various parts of the Mediterranean. Under the old Genoese republic the seamen of Laigueglia were among the few who ventured to trade under their own flag, and to brave the Barbary pirates who infested the sea, and especially the coast of Genoa. 2. *Loano*, eastward of Albenga, a town of 3500 inhabitants, was once a fief of the Fieschi and afterwards of the Doria family. The atmosphere of Loano is considered unhealthy. Loano has several churches, one of which is reckoned handsome. The maritime population of the Genoese Riviera take an especial pride in their churches. The church of the village of Garlenda, near Albenga, has several first-rate paintings, among others a Madonna and Child by Domenichino, which the inhabitants have refused to sell for 20,000 francs. 3. Finale, the name of three small contiguous towns, distinguished as Final Marina, Final Pia, and Final Borgo, the united population of which amounts to about 6000 inhabitants. Final Marina has a handsome collegiate church, designed by Bernini, a college for [illegible] of the [illegible] and a great many of [illegible] of Bamerci[illegible] [illegible]

Elizabeth to the Virgin, in the imperial gallery of Florence; it contains however only the two saints, but beneath it is a predella in three compartments, illustrating in small figures the Annunciation, the Nativity, and the Presentation in the Temple: it has been engraved by V. della Bruna.

Albertinelli was of a very singular disposition, and of dissipated habits. At one time he forsook painting, having taken offence at some criticisms upon his works, and turned publican, an occupation however which he soon exchanged for his original profession. He painted several works in partnership with his friend Fra Bartolomeo, and when that painter joined the order of the Dominicans, Albertinelli completed his unfinished works; among which was the Last Judgment, for the cemetery of Santa Maria Nuova, which, says Vasari, many suppose to have been the entire work of Bartolomeo. Albertinelli was so much distressed at losing the society of Bartolomeo, when the latter turned monk, that his friends had much difficulty in preventing him from following his example. Vasari says that he died about 1520, aged 45, the victim of his own debaucheries. He had some distinguished scholars; the best was Visino, who, according to Vasari, died in Hungary: others were, Giuliano Bugiardini; Franciabigio; and Innocenzio da Imola.

Albertinelli painted in fresco in Florence, in Viterbo, and in Rome. Vasari mentions a very excellent portrait by him of the mother of Lorenzo de' Medici, Donna Alfonsina Orsini, daughter of Roberto Orsini, the constable of Naples. A picture in the Louvre by him is inscribed—'Maricocti Debertinellis Opus. Ano. Dom. M.D.VI.' In the chapter-house of the Carthusians at Florence, a crucifixion in fresco, with the same date, is marked 'Mariotti Florentini Opus.'

(Vasari, *Vite de' Pittori*, &c.)

ALCA'MENES, (Ἀλκαμένης) a celebrated ancient sculptor, and a native of Athens. He was the pupil of Phidias, and lived therefore in the middle of the fifth century B.C., and later. Phidias, Alcamenes, and Polycletus were the three greatest sculptors of ancient Greece; Alcamenes survived Phidias some time, as he was still living in the 95th Olympiad, according to Pausanias, about 400 B.C., for he made two colossal statues of Minerva and Hercules, to commemorate the victory of Thrasybulus over the thirty tyrants, which he dedicated in the temple of Hercules at Thebes: this victory took place in the second year of the 94th Olympiad, or 403 B.C.

Alcamenes was sculptor in marble and statuary in bronze: his most celebrated work was a Venus, known as the Venus ἐν Κήποις or in the gardens; it was in the temple of Venus Urania at Athens. In the dialogue of the Portraits, Lucian makes Polystratus term this statue the noblest of all the works of Alcamenes, and he takes from it the face and hands to contribute towards his ideal portrait of the beautiful Panthea, the daughter (according to Wieland's conjecture) of the imperial fiscal-procurator in Asia, and the concubine of the emperor Marcus Aurelius: she succeeded the Augusta or empress Faustina, but was herself only a concubine (in the Roman sense). Many other ancient writers speak of this statue. Pliny says that Phidias finished it; by which must be understood that he made a few alterations on the finished statue of Alcamenes, which, according to his riper judgment, it required: mere technical finishing is not the work of a great master.

In another statue of Venus, Alcamenes contended with his fellow-pupil Agoracritus of Paros, and the Athenian judges awarded the prize to Alcamenes, not because it was the better work, says Pliny, but because it was the work of their own citizen. Agoracritus was so much hurt at the decision, that he changed his statue into a Nemesis, and sold it to the people of Rhamnus, on condition that it should not be set up in Athens: and as the Rhamnusian Nemesis it was long celebrated as one of the most famous works of antiquity, and was preferred to all other statues whatever by Varro. The statements about this work are various: according to some, it was made by Phidias for Agoracritus; a report which may have been spread by the Rhamnusians to give the statue more value in the opinion of the world. Pausanias, who saw it at Rhamnus, speaks of it as the work of Phidias, and does not mention the name of Agoracritus.

Alcamenes contended also, according to Tzetzes, with Phidias: the subject was a statue of Minerva; and the work of Alcamenes was at first, on account of its higher finish and proportions, preferred to the work of his master, but when fixed in their destined places, the superiority of the statue of Phidias was evident; the latter gained effect, the former lost
it. In this instance, Phidias gave Alcamenes a less
which modern artists might derive a benefit. The g
jority of the statues and works of sculpture in the
churches or other buildings of Europe, appear to h
made without any allowances for either the elevatio
distance from the eye, of the destined locality of th
that a work in which this principle is carried fully o
fitted for any but a similar situation, is not a sufficient
for its neglect, though it may satisfy the artist's vanit

Another celebrated statue by Alcamenes was one c
sus, of ivory and gold, placed in a temple to that g
part of Athens called Λίμναι, the part in which th
is said to have been born. The sculptures also o
terior pediment of the temple of Jupiter at Olym
senting the fight of the Lapithae and the Centaur
Alcamenes. Pausanias mentions besides at Athen
of Mars in the temple of Mars; a triple-bodied
Hecate on the Acropolis, the first in that form;
of Procne and Itys, in the same place. There
Vulcan or Hephaestus at Athens, in which the la
expressed without destroying the beauty of the st
noticed by Cicero and by Valerius Maximus. Paus
tions also an Aesculapius at Mantinea, and Pliny
bronze figure of a pentathlete, or victor in the pen
five athletic exercises, which was called *encrinomen*
five games were—leaping, running, the discus or quo
ing the javelin, and wrestling.

(Pliny, *Hist. Nat.* xxxvi. 5, xxxiv. 8; Lucian,
4, 6, and the note in Wieland's translation; Paus
8, 19, 20, 24, 33; v. 10; viii. 9; ix. 11; Cicer
Deor. i. 30; Valerius Maximus, viii. 11; Tzetz
viii. 193; Winckelmann, *Werke*, vol. vi.; Thiersch,
der bildenden Kunst, &c.)

ALCOHOL, *Medical Properties of.* These are o
fold kind: first, those in which it is employed on ac
its solvent powers, it being, next to water, the most
sively employed solvent, to obtain, preserve, or facilit
administration of a variety of active principles, ve
mineral, or animal; and secondly, those in which
powers over the human frame lead to its use as a the
agent. The former have been already treated of [T
P. C., p. 477]; and it is only necessary to observe ho
besides for these, it is employed in many pharmaceut
cesses in which it does not ultimately appear, eithe
solvent or precipitating properties, such as in the pr
of many of the alkaloids, viz. aconitina, strychnia, &c.
though the most potent medicinal agents we pos
greatly restricted in their application by the hig
charged for them. This arises partly from the min
tity in which they exist in their original sources, th
which produce them; but far more from the high
alcohol, which places our practical chemists at a gre
vantage compared with those of France and Germany

The therapeutic properties of alcohol are therefore
properties to be noticed here; and it is by no means
to discuss points which have excited keen controversi
ference to the employment of alcoholic stimulants as
beverages, but simply that employment of them whic
ceded to be allowable by all parties—their use as r
agents. Besides, as many who do not require them
accordance with the usages of society, in the habit c
them, it is proper to indicate which are the least hurt
excessive use of ardent spirits is deservedly reproba
every reasoning person will gladly lend his aid to root
almost national vice; the evil effects of which are no
to the individual, as the physical ailments engendered
bitual drinking have a great tendency to become he
The mental powers of the offspring are also greatly ir
by the habits of the parent; and diseases of the brain,
rangement of the intellectual faculties, are the cons
The extension of education and the better tone of feeli
higher classes have done something to banish inebri
the upper circles of society; and a more correct und
ing of what is for their true interests has abated it an
labouring classes. Furnishing the operatives with th
of rational and healthful recreation, both mental and
after the hours of toil, will aid this fortunate revoluti
refreshment of a bath will be found greater, more last
more economical for the workman, than any artifici
lant, and has been advocated by themselves. [SCHOOL
p. 501.]

It is proper however that the mode of action of
should be understood, to determine when it should

oderate dose, suitable for the individual, produces
ich are entirely limited to the viscera of the abdo-
ey extend themselves from the solar plexus of nerves
gans upon which the splanchnic nerve is distributed,
e in these a livelier action. A feeling of comfort in
men, quicker and more powerful digestion, stronger
e motions, increased desire for meat and drink, more
secretion, especially augmented secretion from the
are the common phenomena which result from the
egree of its action. A larger quantity, or several
ses repeated at short intervals, extend the action be-
e sphere of the splachnic nerve, even to the spinal
he brain, and entire nervous system. The feeling of
and warmth experienced in the praecordial region is
over the whole frame. The pulse is raised, becomes
owerful and quicker, all muscular actions take place
ore ease, strength, and capacity of endurance, the tone
nervous system is raised, the influence of the nervous
upon the other organs is quicker and more powerful;
ove all, that part of the nervous system whose functions
ented by the brain is most perceptibly increased, as is
the greater cheerfulness, humour, and courage, as well
ore active and acute power of thinking. During this
of action the sensibility to external impressions is un-
d, or in even many instances augmented, as is mani-
y a more eager participation in the incidents occurring
expressed, and in the expansion of the affections
es.

poraneously with these, all the functions of organic
arried on more actively; of which we have proof in
ased secretions, especially of the cutaneous transpira-
d secretion of urine.

his view it is obvious that alcohol is an agent which,
rtain limits, may be most beneficially employed
e portion of the system, particularly the stomach,
kidneys, requires assistance. Hence under the influ-
any sedative poisons, alcohol furnishes the readiest
potent means of counteracting their effects, the pro-
tion of which would prove fatal. Some poisons how-
ticularly those of ranunculaceous plants, such as
d, probably from their active principle being dis-
the spirit, have their deleterious influence increased
l. In the sinking stage of fevers, and many ana-
es, alcohol furnishes the only means of warding off
In malarious districts and in very humid regions, a
use of alcoholic drinks protects the frame against in-
pressions. Hence in Holland, and even in fenny
of our own country, alcohol is useful. When cold is
d to humidity, it is still more serviceable. The Swiss
at great elevations on the Alps, and the shepherd in
lands, set the mists of their mountains at defiance;
er by his 'enziangeist,' or 'bitter-snaps,' the latter
try. Such persons are rarely intoxicated. Many
ith feeble and slow digestion have the process ex-
y a small portion of alcohol taken after their meals.
who suffer much from acidity in the stomach, or
rone to calculous disorders, find great benefit from
ol, in preference to either malt liquors or wines.
Diseases of the Stomach, 3rd edit. p. 9.) The
between pure alcohol and alcohol combined with
ciples in wines has already been pointed out.
. C., p. 465.] With persons very prone to acidity
l agrees better than any wines, especially than the
s; and those disposed to the lithic acid diathesis
preferable to all wines except those of the Rhine,
nent of which however must be habitual, not oc-
mmense benefits would be conferred on the com-
his country, if they could be introduced at a mo-
, as the quantity of alcohol in them is very small
ith other wines.

nce to the chemical composition of alcohol will
is a highly carbonized compound. When taken
produces exhaustion of the nervous power and an
f the circulation, almost apoplectic. Emetics or
-pump, vegetable acids given freely, occasionally
water on the face or head, artificial respiration,
utious venesection, in some instances restore the
iebig says alcohol has not been detected in the
en the quantity taken is not excessive, and can be
y the lungs, this may be true; but the presence
the brain, blood, and urine has been proved by
(Dr. Golding Bird, in *Medical Gazette*, vol.
.)

ALDEGRE'VER, HEINRICH, a celebrated German painter and engraver of the sixteenth century, was born at Soest in Westphalia in 1502. He became the pupil of Albert Dürer, being attracted to Nürnberg by the great fame of that artist, and he imitated his style so closely that he acquired the name of Albert or Albrecht of Westphalia, a circumstance which has misled some writers to call him Albert Aldegrever. There can be no doubt of his name having been Heinrich or Henry, as it is so engraved in two different portraits both executed by himself. As a painter Aldegrever executed little, he was chiefly occupied in engraving his own designs. His plates are generally small, and are executed in a very minute and laboured manner, whence he is reckoned among the so-called little masters, of whom he is one of the most distinguished. His prints are very numerous, exceeding three hundred, and they bear dates between 1522 and 1562, which is supposed to have been the year of his death; it is however a mere conjecture. His designs are conspicuous for the sharp and angular lines of the Gothic style; but though hard and wiry, many of his figures display good anatomical drawing. His subjects are sacred and profane. Thirteen plates of the labours of Hercules are among his very best works: they are very scarce. A print of the Count D'Archambaud, just before his death, killing his son lest he should leave the paths of virtue for those of vice, is also a remarkably good plate. Among the portraits engraved by Aldegrever are those of —Luther, dated 1540; Melanchthon; John of Leyden, king of the Anabaptists; and the fanatic Bernard Knipperdolling. He engraved also many designs for silversmiths and for booksellers.

His paintings are in the same style of design as his engravings, but they impress, still more than his prints, with the feeling of the pains they cost him: his colouring is very high. In the gallery of Berlin there is a small picture of the Last Judgment by him; in the gallery of Munich there is an excellent portrait of a man with a red beard; there are a few of his works at Schleissheim, at Vienna, and at Nürnberg, and at Soest, in some churches.

In a print of Titus Manlius ordering the execution of his son, Aldegrever has introduced an instrument, very similar to the guillotine used by the terrorists of the French revolution: it is dated 1533.

(Heineken, *Dictionnaire des Artistes dont nous avons des Estampes*; Bartsch, *Peintre-Graveur*.)

ALETHO'PTERIS (Sternberg), a genus of fossil Ferns, mostly from the coal formation. (Pecopteris of Brongniart.)

ALFE'NUS VARUS, one of the Roman jurists whose excerpts are contained in the Digest. [Justinian's Legislation, P. C.] He was one of the most distinguished pupils of the great jurist Servius Sulpicius, the friend of Cicero. Pomponius (*Dig.* i. tit. 2) states that he became consul, and it is generally assumed that he is the P. Alphinius who was consul A.D. 2, and the same person as the P. Alfinius or Alfenus Varus of Dion Cassius (lib. lv. Index). But as Sulpicius, the master of Varus, was born about B.C. 106 and died B.C. 43, it is not probable that Alfenus the jurist could be consul so late as A.D. 2.

Acron the scholiast (Horatius, *Sat.* i. 3. v. 130) has a story that Alfenus was a shoemaker at Cremona, who came to Rome, where he became the pupil of Servius Sulpicius, and attained such distinction for his legal knowledge that he was made consul and had a public funeral. The passage of Horace and the remark of the scholiast have occasioned much discussion (Wieland, *Horazens Satiren übersetzt*, note on *Sat.* i. 3. v. 130; Heindorf, *Des Q. Horatius Satiren erklärt*). It is very difficult to form any conclusion from the passage of Horace, though it may perhaps be assumed that he does refer to the jurist Alfenus; but this will not determine whether the story of his early life as given by Acron and alluded to by Horace is true.

Alfenus wrote a work entitled 'Digesta,' in forty books. He is often cited by other jurists; the excerpts in the Digest show that his style was clear. Gellius (vi. 5) quotes a passage from the thirty-fourth book of the Digesta of Alfenus and the second book of the Collectanea, or Conjectanea, as it stands in some editions of Gellius; from which expression one might infer either that the Collectanea was a part of the Digesta of Alfenus, or a different work by Alfenus. But it is not an improbable conjecture that the Collectanea was the compilation of Aufidius Namusa (*Dig.* i. tit. 2) in one hundred and forty books, which he made out of the writings of eight of the pupils of Servius. If so, Gellius referred to the passage both in the original Digesta of Alfenus, and to the same passage in the Collectanea of Namusa.

ALGÆ, FOSSIL. The remains of sea-weeds in a fossil state are less common than their probable abundance in the antient ocean and the generally marine origin of the strata might have led to suppose. This arises perhaps from the cellular texture and destructible nature of the marine plants. Traces however of several genera occur in Silurian, carboniferous, liassic, oolitic, and later deposits.

ALGARDI, ALESSANDRO, an Italian sculptor and architect, chiefly distinguished however as a sculptor. He was the son of a silk-mercer of Bologna, where he was born about 1600, or even earlier, but the dates given by the various writers who have written notices of him are so contradictory, that it is impossible to give a preference with any degree of certainty. He entered the celebrated school of the Carracci, but finding that sculpture was more suitable to his taste than painting, he became the pupil of Giulio Cesare Conventi, a sculptor of celebrity in his day. At the age of twenty, says Bellori, he accompanied Gabrielle Bertazzuoli, the architect, to Mantua, and was introduced to the duke Ferdinand, with whom he apparently became a favourite, as he received many small commissions from him for models, and was afterwards sent by him to Rome with an introduction to the pope's nephew Cardinal Ludovisi: he arrived in Rome in 1625. The cardinal employed him chiefly in the restoration of antient statues; and he received some employment from the Roman jewellers. His first original productions in Rome were two statues in stucco, for the Capella Bondini in the church of San Silvestro on Monte Cavallo. He obtained these commissions through the intercession of his friend Domenichino: they were a John Baptist, and a Magdalen, and obtained for Algardi a considerable reputation; he had however still to depend upon the jewellers for support. His patron Ferdinand, duke of Mantua, died shortly after his arrival in Rome, he quarrelled with Domenichino, and for many years he had no other occupation as a sculptor than that of restoring antient fragments. But about 1640 his prospects changed; he was chosen by Pietro Buoncompagni to execute the statue of San Filippo Neri for the sacristy of the Padri dell' Oratorio of Rome; he made a group in marble of two colossal figures, the saint, and an angel kneeling by his side presenting him a book; and he displayed so much judgment and taste in working the marble, that he raised himself to an equality with the most favoured of his contemporaries; and the Cardinal Bernardino Spada, in consequence of the success of this group, gave him a commission to execute a colossal group in marble of two figures representing the decapitation of St. Paul, for the church of the Padri Bernabiti at Bologna. St. Paul was represented kneeling, with his hands bound together before him; the executioner, entirely naked, was behind the saint, with his sword raised ready to strike. The success of this group was complete; it is technically a work of very great excellence, but in the attitudes it is forced or affected; it however established for Algardi the reputation of the greatest sculptor of his age. He now produced many works in rapid succession, chiefly in metal, both for Bologna and Rome. The principal of these were the monument of Leo XI. in Saint Peter's, and Attila checked by Saint Leo, an alto rilievo of enormous size, for one of the altars of the same church.

Algardi's better fortune commenced after the accession of Innocent X. in 1644, whose niece Costanza Panfili was married to Algardi's friend and patron, prince Nicolo Ludovisi, the nephew of Gregory XV., and himself a Bolognese. Don Camillo Panfili, another of the pope's nephews, entrusted to Algardi the erection of a villa without the gate of San Pancrazio, now well known as the Villa Panfili. As an architectural design it is a work of little merit, though it is Algardi's most successful effort in architecture: it is richly ornamented with sculpture.

Algardi executed also the bronze statue of Innocent X. which was decreed by the Roman people or senate in consideration of his having completed the Capitol. Innocent built the north-east wing, or Nuovo Palazzo de' Conservatori. The senate had voted the execution of the work to Francesco Mochi: why it was not executed by Mochi does not appear; Innocent probably interfered in Algardi's favour. The first casting failed; the second however was completely successful. Innocent is represented sitting, giving the papal benediction, and is placed in that part of the Capitol which was built by him. When the statue was completed, the pope was so well satisfied with it that he placed with his own hands a cross and chain of gold upon Algardi's neck, and
a Cavaliere dell' Abito di Cristo.

The Attila, or La Fuga d'Attila, as it is called, is
alto rilievo in the world; the two principal figures
and Attila are about 10 feet high. The design con
other figures, and is treated pictorially, which
however involves many disagreeable effects, as th
high relief cast their shadows upon those in low re
are intended to be at a greater distance from the
and destroy their effect entirely; the high light
principal figures coming in immediate contrast with
shadows, gives an insignificant and mottled effec
cessory parts. In addition to these objection
another still more detrimental to pictorial effect,
fact of the shadows being vertical as well as ho
they fall upon the ground to which the figures a
as well as upon that on which they stand. This
however, which is in marble, is of itself a work of
though it may not deserve all the praises it has ob
perhaps, on the other hand, is all the censure it h
merited: Count Cicognara has severely criticized it

Algardi received for it 10,000 scudi, a sum pro
valent at that time to 5000*l.* sterling now, and
two hundred times as much as his old friend Do
received a few years before for his Communion of S
one of the finest pictures in Rome. The rilievo wa
in great part by Domenico Guidi of Naples, and w
in 1650.

Algardi died of a fever in 1654. His biographer
his character as generally good, though when he b
he became also avaricious; he was never married,
youth he was very dissipated. The bulk of his pr
inherited by a sister, whose marriage against Algar
was partly or perhaps chiefly the cause of his death.
reputation is nearly exclusively that of a sculptor, a
he ranks amongst the greatest of the moderns.
is vigorous and natural, and his draperies are wel
but his style, when compared with the antique, is
vulgar and affected. He excelled in representi
His architectural designs, of which there are not
purely ornamental; the design itself is subservien
naments; they want mass and feature.

(Passeri, *Vite de' Pittori*, &c.; Bellori, *Vite*
&c.; Cicognara, *Storia della Scultura*; Milizia,

ALGEBRA. In the article on ALGEBRA, P.
not enter on the details of the science, in conformi
plan of the work, which was to avoid methodical
the great branches of human knowledge. Instead
ing to make our work of reference supply the
school-book, we preferred to give those to whom t
elementary work was unnecessary some of the not
were gradually enlarging the boundary of the s
assisting, beyond what was once imagined possible,
the difficulties which it presented to reflecting m
elementary work had been written on the subje
algebra, in its completely explicable form, excep
Mr. Warren's, which rather belong to the state o
than to that of complete development—or, as Dr.
which so far belong to the state of transition as to
TERPRETATION in explaining the meanings of som
symbols. In giving our readers from time to tim
tached portions of the subject as are contained in
AND IMPOSSIBLE QUANTITIES, OPERATION, REL
TERPRETATION, SIGN, ROOT, in P. C., and a few ot
immediate connexion with the subject, we hardly
the publication of any supplement could happen lat
enable us to present the heads of a complete system
the previous explanation of every symbol is so g
render subsequent interpretation, or collection o
meaning from deduced properties, altogether u
Still less did we imagine that, in our time, algebra
a system which has hardly any difficulties of pri
would strive† to invent new systems to examine,
symbols to interpret. Had there been any such
articles in question might have assumed a different
it is, the best thing which can be done is to exh
distinct heads of enunciation, the steps of the tran

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[*] We speak of the first edition: the second volume of the se
not (Dec. 1844) yet published, and the first refers only to
algebra. We regret not having seen this second volume befo
present article.

[†] As Sir W. Hamilton, in his system of *Quaternions* (*Tra*
Acad., Nov. 1843, and *Phil. Mag.* 1844), the author of this artic
on what he calls *triple algebra* (recently read before the Cambrid
cal Society), and perhaps others who have not yet promulgated

nnetic to the complete *double algebra*, as it may e subject matter of which is capable of represen- ce of two dimensions. It is not within our limits ate every one of these heads; but much has been e articles already cited, and by dwelling a little arts which are completely new (as far as this work d), it is probable that the reader who has mastered les will be able to supply what is wanting for

pure arithmetic the subject matter is simple number. ls are 0, implying the absence of all number; 1 or the abbreviation of $1+1$; 3, that of $1+1+1$, &c. symbols $+-\times\div$ and those of powers and roots. symbols have specific meanings, and the symbols of are connected with known operations. There are eral symbols of number, a, b, c, &c., definite, but not that is, each one stands for a definite number, known own, throughout any one train of thought, though it represent the same number in all investigations.

fundamental direct symbols of operation, seen in or $a\times b$, a^{b}, are connected with inverse operations, $-b$, $\frac{a}{b}$ or $a\div b$, $\sqrt[b]{a}$ or $a^{\frac{1}{b}}$. Each inverse operation n difficulties: those of $a\div b$ are overcome by the of the notion of fractions; those of $\sqrt[b]{a}$ by the s in LIMIT, P. C., applied to what is called the extraction of roots. But $a-b$ presents cases of ossibility, as in $3-7$; and this impossibility is being removed as long as the symbols are the ure arithmetic.

les by which operations of pure arithmetic are re found to be capable of classification under five ep in any train of thought leads to anything but ne of these five simple rules, or of complex rules their combination. Of course these rules are un- applied only when they give intelligible results.

f signs.—Whenever two of the signs $+$ and $-$ o any symbol, the result is that like signs give $+$, give $-$.

ertibility of additions and subtractions, as in $a+$ $b+c=c+a-b$, &c.

ertibility of multiplications and divisions, as in $\frac{\times c}{b}$, &c.

tributiveness of multiplications and divisions, as in $d)=ab+ac-ad$, and $\frac{c+d}{a}=\frac{c}{a}+\frac{d}{a}$.

of exponents.—These are $a^{b}\times a^{c}=a^{b+c}$, $a^{b}\div$ $c^{b}=(ac)^{b}$, and $(a^{b})^{c}=a^{bc}$.

ster of the use of these rules can perform all the arithmetical operation, including all that is com- d algebraical, but provided that no steps enter which are arithmetically intelligible. Even the s of computation, so far as they are not acts of y or trial, consist in uses of the first four rules.

mining problems into which the impossible sub- s, whether in process or result, whether from in the problem or in the mode of solving it, the is always to be traced to a diametrically wrong n the meaning of some one quantity, as reading or ascent for descent, &c. And since the im- action can always be reduced to the form $0-a$, $3-7$ is $3-3-4$, or -4), and since this is to require, as a correction, that a units should be ort *diametrically opposite to what was supposed as being found*, it suggests itself to let $+1$ and merely the addition and subtraction of 1, but any kinds of units whatever [NEGATIVE, &c., P. C.; addition and subtraction being only one of the r of opposite meanings which may be signified. e induction shows [SIGN, P. C.] not only that emain true when the last augmentation of mean- d, but that the want of symbolic distinction different meanings of $+$ and $-$ is of no conse- ver. Complete opposition of character in $+$ hat is necessary to the permanence of the rules; stand in the same problem for a unit of gain, a , a unit of future time, a unit of addition, &c.; while -1 stands for a unit of loss, a unit of descent, a unit of past time, a unit of subtraction, &c.

6. The algebra thus established, having all the processes of pure arithmetic, *and no more*, and completely containing pure arithmetic within its range of subjects (for $+1$ and -1 mean addition and subtraction of 1, as well as other things), may be called *single algebra*. Space of one dimension (length) is, so to speak, wide enough for it: if $+1$ signify a unit measured in one direction upon a straight line from a given point, then -1 signifies a unit measured in the opposite direction. Every positive and negative quantity may find its interpretation in this line.

7. On proceeding to ulterior results, it is found that the extension of meaning which is sufficient to admit such symbols as $3-7$ or $0-4$ within the range of intelligible quantities will not do the same for their roots of the second, or fourth, or any even order. Thus, even in the complete single algebra, $\sqrt{-1}$, $\sqrt[4]{-1}$, &c. are as void of meaning as $4-7$ in pure arithmetic: they are not positive quantities; they are not negative quantities; and there are no other sorts. Under the name of *impossible quantities* they were long used without being understood, because they were found to lead to true results. Some defended them on different theories, but the sentiment of Professor Woodhouse must have been the one which guided the class of mathematicians who think on first principles: 'since they lead to true results, they *must have a logic*.' The question was to find that logic: and till it was found, a great part of algebra was *art*, not *science*.

8. Since it has appeared that extension of meaning has succeeded in clearing away one class of difficulties, the means of removing the rest must probably be sought in further extension; but it will give a better idea of the subject to begin by throwing away all meanings, treating the symbols as symbols only, subject to certain five rules of operation. Let the only symbol which retains its meaning be $=$, denoting the identity of what precedes with what follows. We then stand thus:—Let it be granted that there are certain symbols, 0, 1, a, b, c, &c., and symbols of connexion, $+-\times\div a^{b}$ (we cannot here dispense with the letters, since the symbol consists in the manner of placing the letters): let $0+a$ and a be synonymes, and also $0-a$ and $-a$, and $1\times a$ and a, and $a\div 1$ and a: let $1+1$ be abbreviated into 2, $2+1$ into 3, &c.: let $+a-a$ be 0, and let $\times a\div a$ be equivalent to $\times 1$: let the five rules in § 3 be perfectly and universally true, and let a, b, &c. be competent to represent (among other things, perhaps) 0, 1, 2, &c., or any formations from them or from one another. Let no idea of meaning be attached, for the present, to any symbol or to any of the words by which operations are described. Required all manner of methods of forming symbols which must be considered as identical. The collection of such methods is *symbolical algebra*, nothing but symbols and prescribed laws of use. For instance, required a necessary transformation for $(a+b)(c+d)$. By the fourth rule this is $(a+b)c+(a+b)d$, which, by the third rule, is $c(a+b)+d(a+b)$, which again, by the fourth rule, is $ac+bc+(ad+db)$, or $ac+bc+(+ad)+(+db)$, which, by the first rule, is $ac+bc+ad+db$. This symbolical algebra is not a science, but an art: it may be illustrated as follows:—Suppose a person to join the pieces of a boy's dissected map by the backs, without looking at the countries engraved on the fronts: he is then going through the dead and (by itself) uninstructive process of symbolical algebra; the pieces are his symbols, the forms of the edges are his rules for guidance. But another, who turns the map the right way, and puts the countries which he knows into their right places at once, and helps himself to the position of those which he does not know by trying to fit edges together, is going through the improving process of geographical acquirement, which corresponds to an algebra with meanings attached to the symbols. Symbolical algebras may be invented without end: how many of them would be worth anything for the value of their possible systems of meaning, is another question. We avowedly make a retrograde step when we introduce symbolical algebra; we throw away the arithmetic and single algebra which suggested the symbols and their rules, and retain for the moment only the unmeaning symbols and their laws of combination.

9. The next step is, given the symbols, rules, and consequent trains of legitimate transformation, of a system of symbolic algebra, how many and what systems of meanings may be attached to the symbols, so that all the fundamental rules may be true of those meanings, and all the symbolic identities which follow from those rules may be necessary consequences,

also with intelligible meanings. Every such system of meanings, superadded to the symbolical algebra, is a *logical algebra*, or one in which every process of transformation is a reasoning or a collection of reasonings. In all probability there is an infinite number of logical algebras to every self-consistent system of symbolical algebra: we merely note down the list of those which have hitherto been traced from the ordinary system, originally suggested by arithmetic.

I. *Pure arithmetic*, in which the subject matter is number. II. *Single algebra*, in which the symbols represent numbers derived from concrete magnitude, considered as being, in every case, of one or another of two diametrically opposite kinds. III. *Double algebra*, the main subject of this article, in which each symbol represents a line of definite length, and in some definite direction out of the infinite number which may be taken *in one plane*. IV. *Triple and quadruple** *algebra*, in which the directions are not confined to one plane (this subject is in its earliest infancy). V. The *geometry* of the second book of Euclid, and the corresponding solid geometry. Here AB actually means the area of the rectangle under the lines A and B, and ABC the content of the rectangular parallelopiped (or right solid) under the lines A, B, and C: the fundamental rules can be demonstrated, and propositions can rigorously be proved. The ordinary and incomplete mode of demonstrating the second book of Euclid might thus be rendered unobjectionable. VI. The *calculus of operations*, in which the symbols, or as many of them as we choose, are *not magnitudes at all*, but directions to perform certain operations on a variable quantity. [OPERATION, P. C.]

10. It does not follow that every species of logical algebra admits of explanation for every symbol or combination of symbols. Thus I. just mentioned rejects $0-1$; II. rejects $\sqrt{-1}$; III. is perfect; and IV. may perhaps be made so: in V., $AB+C$ means no more than AB, if it have meaning, and A^{B} is wholly inexplicable; and VI. is encumbered with difficulties of new and serious kinds as soon as its elements are passed. It may happen that the proper meaning of a symbol or formula cannot be assigned at the commencement of a logical algebra, but can afterwards be deduced from its symbolic consequences. When this is the case, the deduced meaning must not disturb any one of the five rules. This process is the *interpretation* to which we have alluded, and symbols of which the meaning is laid down from the commencement may be said to be *explained*.

11. It is impossible that a perfect algebra can be founded on ideas of time, loss and gain, or any in which only two directions can be imagined. Space, from the infinity of directions which it admits, is, as yet, the only perfect medium of explanation. Time before and time after a certain epoch may be represented by the positive and negative quantity, but what is there in the idea of time to which $\sqrt{-1}$ can possibly apply? Again, show us a commercial operation which, performed upon a gain, produces a sort of result which can neither be called gain nor loss, but which repeated *two* or more times upon a gain, turns it into a loss—and we can immediately construct a system of commercial algebra, in which $\sqrt{-1}$ shall be intelligible. But, as yet, the necessary ideas are found in geometry only, which causes some persons to object to the extension of algebra. But these surely forget that even common single algebra must derive its theory of oppositions from concrete quantity; -1, standing alone, is unintelligible in the science of pure number.

12. Remark the manner in which [RELATION, P. C.] the definitions of $a+b$ and ab can be given, even in arithmetic, in terms of process, without mention of subject-matter: $a+b$ requires us to proceed from a as we proceed from 0 to form b; ab requires us to proceed with a as we should with 1 to form b.

13. Let the common symbol of algebra signify a length in a direction in a certain plane, change either of length or direction demanding change of symbol. Take a point O for the *zero point* or *origin*, and let 0 signify that we do not leave that point. From O draw any line at pleasure for the *axis of length*, and take a length OU upon it for 1: continue the unit axis both ways. Draw a perpendicular through O to the axis of length, and call it the *axis of direction:* the reasons for these terms will appear in the sequel.

14. Let $A+B$ denote the distance and direction from the origin which is gained by going over first A and then B; and let $A-B$ denote that gained by going over first A and then a line equal and contrary in direction to B. Let denote a line whose length has units equal to the duct of the units in the lengths of A and B, and th of the angles which they make with the unit line angle it makes with the unit line. Similarly, let A the quotient of the lengths of A and B for its length difference of the angles for its angle. These defini fully explained in NEGATIVE, &c., P.C., and RELATI

15. From the last it appears as an actual conse definition, that $-A$ means simply a line equal and to A: and also that $+1+1$ or $+2$ can mean noth units extended on the unit-side of the axis of lengt on; while -2 means 2 units extended on the oppo the axis of length. It also appears that $A+B$ and the operations of single algebra whenever the two l the same direction. And if all lines be on the axis all the four operations are those of single algebra they be all on the unit-side of the axis of lengt nothing but pure arithmetic; except when an subtraction obliges us either to reject the process, o the definition and pass to the opposite side of length.

16. Make a positive and negative direction on direction, thus: Choose a direction of revolution line revolving round the origin, and setting out axis of length shall be said to revolve positi the unit revolve positively, and let the first sid axis of direction which it meets be considered the side of that axis. Let the opposite direction of revo called negative. But if any difficulty arise about th negative angles, remember that this is merely matter venience, and can as well be dispensed with. Fo angles may be added to any angle of direction, witho ing the direction indicated: and it is perfectly in whether we speak of −160° in the negative direct +200° in the positive direction.

17. By $A=(a, \alpha)$, let us agree to mean that A sig line of a units of length, inclined at an angle α to the side of the axis of length. Use the theoretical mode [P. C.] of measuring angles. Then (a, α), $(a, \alpha\pm 2$ $\alpha\pm 4\pi)$, &c., are all representations of the same li The peculiar symbols of the new algebra, as long as th wanted, shall be capital letters; small letters denoti symbols of the single algebra.

18. The first four of the fundamental rules in § 3 a easily shown to be true. The geometrical propositions cipally required are two. First, that any number of l being given and their directions, if we set off from a through those lengths and in those directions, one af other, we reach one and the same point in whatever or lines of progress are taken. Secondly, that if any p revolve about one of its angular points, while at the sa the sides and diagonals which meet in that point changed in the same ratio, the figure always remains to what it was at the outset. With these propositions following—

$$(a, \alpha)\times(b, \beta)=(ab, \alpha+\beta) \qquad \frac{(a, \alpha)}{(b, \beta)}=\left(\frac{a}{b}, \alpha-\right.$$

which are merely expressions of the definitions, there be much difficulty in establishing the first four of the

19. Let the square, cube, fourth power, &c. of A, be denoted in full by AA, AAA, AAAA, &c., and corresponding roots by $\sqrt{A}$, $\sqrt[3]{A}$, $\sqrt[4]{A}$, &c. There is no difficulty in establishing, as in NEGATIVE, &c., P the mth power of the nth root of (a, α) is derived from

$$\left(\sqrt[n]{a^{m}}, \frac{m\alpha\pm 2k\pi}{n}\right).$$

k being any integer; that $\sqrt[n]{A}$ has n values and no mo that $\sqrt{-1}$ stands for a unit on one side (say on the posi side) of the axis of direction, and $-\sqrt{-1}$ for a unit on negative side. Also, as in the article cited, that, if p and be the projections of A, on the axis of length and directio that A is identical in meaning with $p+q\sqrt{-1}$ an $a(\cos\alpha+\sin\alpha\,.\,\sqrt{-1})$. Indeed, at this point it wil visable for the student to review the imperfect system GATIVE, P. C., &c., only reading exponents as is do above, powers at full length, roots with the old radical

20. Why do we not hitherto admit the exponent, a fine A^{2} to mean AA, &c.? Because we are not p with a definition which will include *all* exponents. article just cited, we get the meaning of $\epsilon^{\theta\sqrt{-1}}$, by int

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* By the quadruple algebra we mean Sir W. Hamilton's *quaternions*, which we call quadruple because its author calls it so; but inasmuch as it finds its complete interpretation in space of three dimensions, we consider it as *triple*. Its symbolic rules are not altogether those of ordinary algebra.

m, and it seems only a sort of accident that it should a intelligible meaning. In order to provide beforehand plete definition of the exponent, which shall make $b\sqrt{-1})^{c+d\sqrt{-1}}$ as fully explained as any other symbol, io, we must premise knowledge of the arithmetical theory perian LOGARITHMS, P. C., and must lay down the definition of a line which answers to, and performs all the functions garithm. But as it is inconvenient to retain this name, substitute for it the word *logometer*, reserving the word thm for arithmetical use. By λA, the logometer of A α), is meant a line of which the projections on the of length and direction are log a and α; a line, in fact, length $\sqrt{(\log^2 a+\alpha^2)}$ inclined to the unit-line at an whose tangent is $\alpha \div \log a$. Conversely, the line whose meter is B or $(b,\ \beta)$ has $b \cos \beta$ for the logarithm of its th, and $b \sin \beta$ for the angle (number of theoretical units he angle). Every line has an infinite number of logometers: for the angle α may be read as $\alpha \pm 2m\pi$, where m is integer; and thus we have an infinite number of logometers, hypothenuses to a set of right-angled triangles, whose on base is log a on the axis of length. But no logometer gs to more than one primitive line.

The logometer has the fundamental properties of a thm: thus $\lambda A+\lambda B=\lambda(AB)$, meaning that any logometer of A added (bear in mind the extended meaning of all s of operation) to any logometer of B gives one of the eters of AB. We shall endeavour to give short heads onstration to this and the following propositions:—It is y shown that the projections of two lines on either axis e added (with their proper signs) to give the projection sum. Now in $\lambda A+\lambda B$, the sums of the projections a+log b and $\alpha+\beta$: but the projections of $\lambda(AB)$ or $+\beta)$ are by definition log (ab) and $\alpha+\beta$; whence the tion follows.

Denoting by ε, as usual, the base of Napier's logarithms, y to see that $(\varepsilon,\ 0)$ has the simple unit line for one of meters, or $(1,\ 0)$, or 1; also that $\theta\sqrt{-1}$ is one of the ers of a unit of length inclined at the angle θ, or of r of $\cos\theta+\sin\theta\ .\ \sqrt{-1}$.

Now let A^B be defined to mean the line which has for its logometers B multiplied into any one of the logo- of A: accordingly A^B has as many meanings as we rive different lines by this process from the different ters of A. And we shall show, first, that the funda- rules are satisfied by this definition; secondly, that ever B means a length of b units *in the axis of length*, should A^B is exactly the A^b of common algebra. It is ently obvious that A^B has meaning or meanings for all assigned lengths and directions of A and B.

Since ε^A means the line where logometer is $A\lambda\varepsilon$ or A, ws that $\varepsilon^{\lambda A}$ is the same as A. Hence $\varepsilon^{B\lambda A}$ is the s A^B, the line whose logometer is $B\lambda A$.

The sum of $B\lambda A$ and $C\lambda A$ (the logometers of A^B is $(B+C)\,\lambda A$, which is, by definition, the logometer Hence A^{B+C} and $A^B . A^C$, having the same logo- e identical. Again, $A^B\,C^B$ has for its logometer C or $B\lambda(AC)$, which is also the logometer of nce $A^B\,C^B$ and $(AC)^B$ are identical. Thirdly, ter of $(A^B)^C$ is $C\times\lambda\,(A^B)$ or $C\times B\times\lambda A$, which logometer of A^{BC}: hence $\left(A^B\right)^C$ and A^{BC} are Consequently the fifth fundamental rule is true re defined.

B be a line on the axis of length, represented by $,\ \pi)$ according as it is positive or negative. Then de simply by multiplying the length of λA by b, it otherwise unaltered in the first case, or turning wo right angles in the second. In the first case the of $B\lambda A$ are b times those of λA, in the second lso their signs changed. In the first case then are the projections of the logometer of A^B, or A^B , agreeing with A^b in common algebra: in the second case A^B is $\left(a^{-b},\ -b\alpha\right)$, agreeing with A^{-b}.

27. The meaning of $\varepsilon^{\theta\sqrt{-1}}$ is the line whose logometer is $\theta\sqrt{-1}\times\log\ (\varepsilon,\ 0)$, or $\theta\sqrt{-1}$. This line is $(1,\ \theta)$, or $\cos\theta+\sin\theta\ .\ \sqrt{-1}$, whence the equation

$$\varepsilon^{\theta\sqrt{-1}}=\cos\theta+\sin\theta\ .\ \sqrt{-1}\ \ldots.\ (\theta)$$

is a necessary consequence of the various trains of definition. Now as all we know of these trains of definition is that the meanings of the symbols satisfy the five rules in § 3, it may seem to be too much that so remarkable an equation as the last should be actually involved in the definitions, instead of being the result of a long sequence of reasonings. And in truth it is too much in one point: for since all our preceding reasoning on the subject of A^B would apply equally to any base we might choose for logarithms, and any unit for measuring angles, what have we done but prove the preceding equation true for any base and any angular unit? And we reply that so far as the definition of A^B is concerned, our proof is perfectly general: bnt that, on looking back, we find a restrictive connexion between the logarithmic base and the angular unit, as follows:—It is very easy to see that in our prior definitions, the equation

$$\{(1,\ \theta)\ .\ (1,\ \theta)\ .\ (1,\ \theta)\ \ldots\ (m \text{ times})\}=(1,\ m\theta)$$

leads to the following

$$\{\cos\theta+\sin\theta\ .\ \sqrt{-1}\}^m=\cos m\theta+\sin m\theta\ .\ \sqrt{-1}$$

in which we may use m as an exponent, since for the simple integer, representing a line in the axis of length, the definition in § 23 gives $A^m=AAA\ldots(m \text{ times})$. Let θ be the angular unit; then we have

$$(\cos 1+\sin 1\ .\ \sqrt{-1})^m=\cos m+\sin m\ .\ \sqrt{-1}.$$

But the last is $\varepsilon^{m\sqrt{-1}}$, if we introduce the complete exponent from § 23; therefore it must be an equation of connexion between ε and the mode of assigning angle 1, that

$$\varepsilon^{m\sqrt{-1}} \text{ should be } (\cos 1+\sin 1\ .\ \sqrt{-1})^m$$

for all integer values of m: and this not merely from equation (θ), but from comparison of what $\cos 1+\sin 1\ .\ \sqrt{-1}$ must mean in the definitions prior to that of the exponent, with the complete exponential meaning of $\varepsilon^{\sqrt{-1}}$. Hence we must have ε, the base of the logarithms, connected with the angular unit by the equation

$$\varepsilon^{\sqrt{-1}}=\cos 1+\sin 1\ .\ \sqrt{-1}$$

and any base and angular unit which satisfy this condition will do. The most simple way of doing this is to take $\varepsilon=2{\cdot}71828\ldots$ as usual, and the angular unit such that there shall be π or $3{\cdot}14159\ldots.$ units in two right angles: but if any one should prefer $\sqrt[n]{(2{\cdot}71828\ldots)}$ for a base, and $n\times 3{\cdot}14159\ldots$ for the number of units in two right angles, he might get into trouble, but not into error.

28. Another difficulty, of the sort which arises when the result seems above the means employed in the demonstration, is that we have a complete system of trigonometry ready for demonstration by mere algebraical mechanism, without casting a further thought on the meaning of the symbols $\cos\theta$ and $\sin\theta$, or more on those of $\tan\theta$, $\cot\theta$, $\sec\theta$, $\operatorname{cosec}\theta$, than to make them, by definition, severally mean, $\sin\theta\div\cos\theta$, $\cos\theta\div\sin\theta$, $1\div\cos\theta$, and $1\div\sin\theta$. All we have done with $\cos\theta$ and $\sin\theta$ is to take them into our system as expressing the numerical values of the projections of a unit inclined at the angle θ upon the axes of length and direction. We have not even directly used $\sin^2\theta+\cos^2\theta=1$. But it should be remembered, that in proving generally $A\ (B+C)=AB+AC$, we have used the property of *similar figures*, an assumption which is quite sufficient to be the basis of the demonstration of Euclid I. 47, on which $\sin^2\theta+\cos^2\theta=1$ depends. And those who attentively read Euclid see that he does, in the sixth book, prove I. 47 over again, without any use of it, in showing that all similar figures described on the three sides of a right-angled triangle have the two smaller together equal to the greater. [HYPOTHENUSE, P. C.]

In the above definition of $\sin\theta$ and $\cos\theta$ it is clear that $\cos\ (-\theta)=\cos\theta$ and $\sin\ (-\theta)=-\sin\theta$, whence the first of the following, being universally true, gives the second:

$$\varepsilon^{\theta\sqrt{-1}}=\cos\theta+\sin\theta\ .\ \sqrt{-1}$$

$$\varepsilon^{-\theta\sqrt{-1}}=\cos\theta-\sin\theta\ .\ \sqrt{-1}$$

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erpendicular lines would do; but to choose any other except gth and direction would be a step precisely equivalent to preer base to the Naperian in the logarithms of common algebra

Whence we have

$$(\cos\theta + \sin\theta\sqrt{-1})\,(\cos\theta - \sin\theta\,.\,\sqrt{-1}) = \varepsilon^0$$

Now ε^0, by definition, has $0\times\lambda\varepsilon$, or 0×1, or 0, for its logometer, and is therefore (1, 0) or 1. And the first side is, by common application of rules, $\cos^2\theta + \sin^2\theta$. If any one, instead of merely applying rules to the equation

$$(\cos\theta + \sin\theta\,.\,\sqrt{-1})\,(\cos\theta - \sin\theta\,.\,\sqrt{-1}) = 1,$$

should proceed to demonstrate the rules upon this instance, he would, in a circuitous way, be led to a perfect geometrical demonstration of $\sin^2\theta + \cos^2\theta = 1$.

29. No equation of this system, which hitherto admits of expression, presents any difficulty as to the meaning of its sides, or any combination of symbols for which the meaning is to be found by interpretation. Perhaps one of the most remarkable results of the antient system of algebra is the equation

$$\pi = \frac{\log(-1)}{\sqrt{-1}}$$

Some algebraical writers have stated that -1 has neither square root nor logarithm, and without further warning have afterwards made the non-existent logarithm, divided by the non-existent square root, give the ratio of the circumference of a circle to its diameter. Others have given fair warning that, in using what they called imaginary quantities, they were appealing, more or less, to experience; seeing that operations so conducted always led to truth, when, by the ultimate disappearance of $\sqrt{-1}$, the result could be interpreted, they were content to use such an equation as $\pi\sqrt{-1} = \log(-1)$ as an instrument of which the power was known, though its mechanism was concealed. In the complete system it is visibly obvious that $\pi\sqrt{-1}$ is *one* of the logometers of -1, or of $(1, \pi)$.

30. In ordinary working, there is no objection to dropping the distinction between the logometer and the logarithm, there being no difference between the two in operations.

That this system will finally be introduced into elementary instruction we entertain no doubt whatever. But how soon will this take place? The school-books hardly yet teach the interpretation of the negative quantity: so that there would be but little hope of the speedy success of the complete system, even if elementary works existed by which to make it known. But truth must conquer at last: and the respect with which the memory will be preserved of the mathematicians who were neither discouraged by the difficulties nor rendered incredulous by the mysteries of the antient system, will not protect from ridicule those who shall obstinately refuse to see light because there was once darkness, or shall wilfully continue in the imperfect system from which those who wish the exact sciences to be in all their parts the perfection of reason are most glad to be delivered. With respect to those parts of the doctrine of series, and of the integral calculus, which still present difficulties, though of a different character from those here treated, the lesson taught by the victory over what was rashly called *impossible*, which many heads have required many years to gain, is—Never refuse to examine, and to continue in the examination of, all consequences of the symbolic laws of algebra: there is every reason to hope that the symbols are always right, even though the views of their explanation may require correction.

ALGEBRAIC GEOMETRY. The regular treatises in this as in every other case, cannot be dispensed with by any of our readers who are desirous of acquiring it. But in this article, as in the last, we are led to write by the total want of elementary works to explain a new and useful modification of the mode of viewing a part of the subject. In the body of the Cyclopædia we avoided, as much as we could, articles which presumed, from their outset, a very ready acquaintance with the details of the branch on which they entered. Thus, though we might take for granted much algebra in treating the elements of the differential calculus, and much differential calculus in such an article as OPERATION, P. C., or TAYLOR'S THEOREM, P. C., yet we endeavoured to make every article to which a beginner was likely to refer, as elementary an exposition as we could. But it may be allowed, in a Supplement, to make some attempt at supplying the omissions which, during the progress of the Cyclopædia itself, we have observed in elementary works, so far as such defects are capable of being remedied within our limits of space: and the mere mention of those limits is a sufficient excuse for our assuming in the reader a reasonable knowledge of existing works.

In geometry of two dimensions, the number of co-ordinates is not so great as to make symmetrical disposition extremely necessary at the outset. We should not, fo much by forming the equation of the straig $ay + bx + c = 0$ instead of $y = ax + b$; in who have preferred the symmetrical course l loaded themselves with symbols, to an extent burden thus imposed on the memory greater which symmetry relieves it. But it is not sc three dimensions. There are here three co-o point; and, as it happens, symmetry, even w augmentation of the number of symbols, is fo whole, an assistance in the remembrance o cordingly, the equations of the plane and s formulæ connected with them, are expressed venience in the manner of which the followi the first use of which, as far as we know, celebrated work of Malus, 'Théorie de la do Paris, 1810, 4to.

1. In arranging expressions containing th different sets of three, symmetry requires th shall ever appear at the beginning of one e appearing at the end of another; and that expressions which are formed by combinat interchange of any two letters, or of the cor taken out of different sets, shall reproduce th pressions in another order, or at most with Thus, $a - b$, $b - c$, $c - a$, are symmetrical, an $bz - cy$, $cx - az$.

2. When there are two equations of the form $a'x + b'y + c'z = 0$, the quantities are not proportions are: and x, y, and z are in the p

$$bc' - cb',\ ca' - ac',\ ab' - ba'$$

3. An expression of the form

$$(ay - bx)^2 + (bz - cy)^2 + (cx -$$

is identical with

$$(a^2 + b^2 + c^2)\,(x^2 + y^2 + z^2) - (ax +$$

4. The form of the equation of a plan $Cz + D = 0$; the common form $z = Ax +$ symmetrical. The plane which passes th whose co-ordinates are p, q, r, which call th is

$$A(x - p) + B(y - q) + C(z -$$

The plane which passes through the three $(p'\,q'\,r')$, $(p''\,q''\,r'')$, is

$$\{(q' - q)\,(r'' - r) - (r' - r)\,(q'' - q)\}\,(x$$

one term of which is enough; symmetry wi rest. Remember the order pq, qr, rp.

5. When such symmetrical expression $bc' - cb'$, $ca' - ac'$, are to be constructed, th write down a, b, c, a and a', b', c', a' under to calculate from the left to the end, without beginning. Thus from

$$\begin{array}{cccc} 8 & 1 & 3 & 8 \\ 2 & 4 & 6 & 2 \end{array}$$

we have

$$30,\ -6,\ -42$$

6. The most convenient form of the equat line is as follows. Let (abc) be a point on and let A B C be any three quantities propo sines of the angles which the straight line ma rections of x, y, z. Then the equations of are

$$\frac{x - a}{A} = \frac{y - b}{B} = \frac{z - c}{C}$$

The following system is sometimes conveni

$$x = a + Av,\ y = b + Bv,\ z = c$$

where $v\sqrt{(A^2 + B^2 + C^2)}$ is the distance be (xyz).

7. The plane whose equation is $A(x - a)$ be called the plane $(ABCabc)$, and the straig tioned may be called the straight line (ABC out this article capitals are generally proporti angles, and small letters are co-ordinates order of co-ordinates is xyz, and all letters co ordinates run in consecutive triplets, as A But when triplets of pairs are made, as AB, AB particularly belongs to the co-ordinate to tached, BC to that of A, and CA to that of

8. The angles made by the straight line (the axes have for their cosines $A \div \sqrt{(A^2 +$

h made by the two straight lines (ABC &c.),
.) has for its cosine

$$\frac{AA'+BB'+CC'}{\sqrt{(A^2+B^2+C^2)}\sqrt{(A'^2+B'^2+C'^2)}}$$

les are perpendicular. $AA'+BB'+CC'=0$;
they are parallel, A, B, C are in the same propor-
, B', C'.
agles made by the plane (ABC &c.) with the planes
ad *xy*, are $A \div \sqrt{(A^2+B^2+C^2)}$, &c.; the co-
he angle made by the planes (ABC &c.) and
&c.) with one another is as in the last, and also the
s of perpendicularity and parallelism.
he plane (ABC*abc*) is at right angles to the line
r), whatever *a*, *b*, *c*, *p*, *q*, *r* may be. And the plane
&c.) is at right angles to the line (A′B′C′ &c.) when-
B, C, are proportional to A′, B′, C′. But the plane
&c.) is parallel to the line (A′B′C′ &c.) when AA′+
C′ = 0.
straight line (ABC*abc*) lies entirely in the plane
) when

$$P(a-p)+Q(b-q)+R(c-r)=0$$
$$AP+BQ+CR=0$$

intersection of the two planes (PQR*pqr*) and
r′) is the straight line (ABC*abc*), in which A,
proportional to QR′−RQ′, RP′−PR′, PQ′−QP′,

$$P(a-p)+Q(b-q)+C(c-r)=0$$
$$(a-p')+Q'(b-q')+C'(c-r')=0$$

intersection of the plane (PQR*pqr*) and the
(ABC*abc*) is at the point whose co-ordinates are
B*r*, *c*+C*r*, where

$$r=\frac{P(p-a)+Q(q-b)+R(r-c)}{AP+BQ+CR}$$

straight lines (ABC*abc*) and (A′B′C′*a*′*b*′*c*′) do
ly speaking, intersect at all: their shortest dis-
C′−CB′)(*a*−*a*′) + &c. divided by $\sqrt{\{(BC'-}$
&c.}, and they meet when the numerator of this
othing. The plane (PQR*pqr*) is parallel to both
s when P, Q, R, are proportional to BC′−CB′,
, AB′−BA′.
equation of a plane which passes through the
e (ABC*abc*) and is perpendicular to the plane
is

$$(BR-CQ)(x-a)+(CP-AR)(y-b)$$
$$+(AQ-BP)(z-c)=0$$

perpendicular distance from the point (*abc*) to the
pqr) is P(*a*−*p*) + Q(*b*−*q*) + R(*c*−*r*) divided
Q²+R²), independently of sign. And the per-
istance between the parallel planes (PQR*pqr*)
q′*r*′) is P(*p*−*p*′) + &c. divided by √(P²+&c.).
perpendicular from the point (*lmn*) upon the
(ABC*abc*) meets it in a point of which the co-
a+A*r*, &c. where

$$r=\frac{A(l-a)+B(m-b)+C(n-c)}{A^2+B^2+C^2};$$

re of the length of that perpendicular is

$$-\frac{\{A(l-a+B(m-b)+C(n-c)\}^2}{A^2+B^2+C^2}$$

ficient for a specimen of the method, and even
y of the most important propositions respecting
ine and plane. On the good effect of symmetry
necessary to make much remark: not only are
e easily remembered, since the whole can be
recollection of a part—and more easily used,
ymmetrical result is an indication of error—but the
sion can be shortened in type, of which the above
proof. It would have been impossible safely to
many results in twice the space, if the ordinary
ism had been adopted. The best mode of treat-
ary forms for the straight line, such as $y=ax+a$,
to reduce them to the preceding, thus:

$$\frac{x-0}{1}=\frac{y-a}{a}=\frac{z-\beta}{b}$$

E, L' (pronounced *Algerè*: ALGERIA in Eng-
ame given by the French to their newly-acquired
Northern Africa, which comprise the whole state formerly known as the Regency of Algiers. We have given under ALGIERS, P. C., a description of the country and its inhabitants, as they were at the time of the French invasion, which was the alleged consequence of a personal insult from the Dey to the consul of France. By the capitulation of the 4th of July, 1830, the French became possessed 'of the city of Algiers, and the forts and harbours depending on it.' No mention was made of the provinces, or of the native tribes, over which the authority of the Dey was little else than nominal. The Dey capitulated to the French more like the commander of a military garrison than as the sovereign of an extensive state. In truth, the Dey himself was, ostensibly at least, but an officer of the Turkish sultan. The native Arabs and Kabyles were told in the proclamations that the French had come to deliver them from the yoke of the Turks, who were, in reality, aliens to the country, pirates by sea, and usurpers and marauders by land. The Arab tribes in the neighbourhood of Algiers, Oran, and the other towns garrisoned by the Turks, were in the habit of paying a reluctant tribute to the Dey in order that they might graze their cattle in the plains without molestation, but the Kabyles who live in the mountains, as well as the more remote Bedwin Arabs of the interior, seldom, if ever, entered into any such agreement, and the Turks only succeeded in extorting anything from them by sending armed detachments at harvest-time to seize by force what they could, or by surprising the Kabyle villages and kidnapping some of their young men, whom the parents were obliged to ransom. Such was the pretended sovereignty of the Turks over the greater part of the territory of the so-called Regency of Algiers.

The French became possessed by conquest of Algiers, Oran, Bona, and one or two more towns on or near the coast. The Moors and other mixed races who inhabit these places, became by conquest subjects of France. Of the three beys, or governors of provinces, Turkish officers subordinate to the Dey, that of Oran submitted to France; but Ahmed Bey of Constantina, being far off in a strong country, refused allegiance, and the Bey of Titteri, after having submitted at first, revolted soon after, and was joined by several tribes of Arabs and Kabyles. Thus it was that a course of hostilities was entered upon between the French and the natives, by which in the course of the last fourteen years the French conquest has spread from the frontiers of Tunis on the east, to those of Marocco on the west, and as far as the borders of the great Desert on the south. It is perhaps opportune for a knowledge of these complicated events, as well as for affording information on the present condition of the country, to recapitulate briefly, year after year, the progress of the French arms in Northern Africa.

Marshal Bourmont, after taking possession of the town of Algiers, gave occasion to the first hostilities with the Arabs, by marching a column of 2000 men to Bledah, where there was a meeting of Arab chiefs, who were consulting about their future relations with the French. On the approach of the troops the Arabs became alarmed, some dispersed, and others ran to arms and attacked the French, who were obliged to retire to Algiers with loss. In consequence of the revolution at Paris in July, 1830, and the change of dynasty which followed, Bourmont was recalled, and General Clausel was sent to succeed him. He arrived at Algiers in the beginning of September, 1830. In the following October he marched against the Bey of Titteri, crossed the Metidja plain, occupied Bledah at the foot of the Little Atlas, and then forcing the pass of Mount Teneah, entered the town of Medeyah, the residence of the Bey, about 45 miles south of Algiers. Clausel deposed the Bey, and appointed a Moor of Algiers in his place. In the mean time the Sheik Benzamoom, at the head of the Kabyles from the eastern mountains, attacked the French rear-guard at Bledah, and massacred 50 artillerymen whom he surprised on the road. General Clausel, having left a garrison at Medeyah, hastened back to Bledah, which the soldiers plundered out of revenge, as the inhabitants had shown themselves hostile to them.

General Clausel was the first to suggest the colonization of the territory of Algiers with settlers from Europe. Marshal Gerard, then minister-at-war, approved of the plan, and fixed on the Metidja plain, which lies between the table-land of Algiers and the ridge of the Little Atlas, for the first experiment. But neither the general nor the marshal seems to have thought of ascertaining first to whom the lands in the Metidja belonged. Baron Pichon, who was appointed, a year after, Civil Intendant of Algiers, having made inquiries, discovered that the lands in question belonged chiefly to Moorish proprietors, inhabitants of Algiers, the quiet subjects of France, whose property was solemnly guaranteed to them by the capitulation, and who let their lands to Arab or Kabyle cultivators or graziers. (Pichon, *Alger sous la Domination Française*, 8vo. 1833; a very interesting book for the history of the earlier period of the French occupation of Algiers.)

General Clausel entered into negotiations with the Bey of Tunis, by which the two provinces of Constantina and of Oran, the two great eastern and western divisions of the state of Algiers, were to be administered by two princes of the reigning Moorish dynasty of Tunis with the title of Beys, on their paying an annual tribute to France. The Tunisians were to assist the French in dispossessing the refractory Ahmed Bey of Constantina. The treaty was agreed on by the court of Tunis; but, when sent over to France, it was thrown out by the minister for foreign affairs. Meantime a nephew of the Emperor of Marocco at the head of a body of cavalry overran the country of Tlemsan, upon which Marocco had some antient claims, and he invited the tribes of the west to place themselves under the protection of a Moslem prince of the Arab race. Clausel sent reinforcements to Oran, and, notwithstanding the paucity of his means, was inclined to adopt hostile measures against Marocco, but he was prevented again by the minister for foreign affairs, General Sebastiani, who preferred resorting to diplomatic means to obtain the evacuation of the district of Tremecen or Tlemsan by the Prince of Marocco, who ultimately withdrew to his own country. General Clausel, dissatisfied with the repeated disappointments he had encountered from the French ministry, returned home in disgust, and published an apology of the acts of his administration. (*Observations du Général Clausel sur quelques Actes de son Commandement à Alger*, 8vo. Paris, 1831.)

General Berthezène remained in command at Algiers: although a distinguished officer of Napoleon's school, he was a temperate sober-headed man, who did not indulge in the sanguine aspirations of his predecessor. He resolved on contracting his line of posts within a narrower compass. He marched at the end of June, 1831, to relieve the garrison of Medeyah, which was closely blockaded by the Kabyles, and having evacuated the place, retraced his steps to Algiers, fighting his way through the pass of Teneah, harassed by swarms of Kabyles and Arabs, who followed him all the way across the Metidja plain to within a few miles from Algiers. He wrote in the following month of August a long but interesting report to the minister-at-war, in which he refuted some exaggerated notions of the partisans of conquest and colonization, which letter is given by Baron Pichon in the appendix to his work, p. 44. Berthezène applied himself to cultivate the friendship of the sheiks of the Arab tribes, who conceived a high opinion of his sense of justice. Unfortunately at the end of 1831, Berthezène was superseded by Savary, Duke of Rovigo, who on his arrival at Algiers found himself beset by a party who talked loudly of exterminating the natives, or driving them back to the Desert, taking possession of their property, and distributing the lands by lots to French colonists. General Berthezène after his return to France published a very interesting and impartial work: 'Dixhuit Mois à Alger, ou récit des évenèmens qui s'y sont passés depuis le 14 Juin, 1830, jour du débarquement de l'armée Française jusqu'à la fin de Décembre, 1831,' Montpellier, 1834.

The administration of Savary lasted little more than a twelvemonth. Its character was harsh, prejudicial, and disorderly. It alienated the natives of all races and classes. Several Arabs and Moors of distinction were summarily executed. The Ouffias, a tribe of unoffending Arabs in the neighbourhood of Algiers, were wantonly exterminated; and sweeping confiscations of private property took place. The result was a general rise of all the tribes round Algiers and Oran, and the stoppage of all communication with the interior. Pichon, in his work already noticed, and General Brossard, in his 'Mémoire présenté au Duc de Dalmatie sur les moyens d'assurer la securité du territoire d'Alger,' give much information concerning the dismal period of 1832.

In 1833 Savary left Algiers on account of ill health, and returned to Paris, where he died in June of that year. General Voirol remained pro tempore 'commander-in-chief of the French possessions in North Africa.' During the session of that year in the Chamber of Deputies, Marshal Clausel, who continued to be a warm supporter of the system of colonization, after magnifying the importance of Algiers to France, which he compared to that of the East Indies to England, asked the ministers about their intentions concerning Algiers.
The president of the council replied, that '
tention of evacuating the country; that Fran
to act as she pleased, being untrammelled by
with foreign powers respecting it; that for
government thought proper to confine itself
of the three principal maritime stations, namel
and Bona, but that it might be thought adv
time to occupy two or three more points on th
there was nothing decided as yet on that su
gard to the plans for colonizing the country,
was ready to favour them if carried on by p
but had no intention to pursue them on its ow
its own means.' These explanations seemed
satisfaction to the Chamber. The revenu
Algiers figured in the budget to the amount o
francs, whilst the whole annual expenditure
possession of and administer the country w
Chamber to amount to 30,000,000 francs.
ployed in North Africa consisted of 30,000
4000 were turbulent characters, chiefly from
been formed into a fighting corps. A c
native troops, by the name of Zouaves, was
well as a battalion of Turks, and a foreign leg
men of all nations.

In May of that year, General Desmichels, g
sent an expedition against a tribe of Gharabas
who had advanced to within 15 miles of Oran;
prised their camp, killed 300 Arabs, and c
women and children, and their cattle; but o
Oran the French were much harassed by
Shortly after Abd-el-Kader, the son of an infl
who in the year 1832, in the midst of the
produced by the fall of the Turkish power,
title of emir and bey of Mascara, and had g
banner the Arab populations of the west, adv
horse to within sight of Oran, and attacked the
but after some sharp fighting was obliged t
loss of 800 men. The Gharabas then entered
with the French, who restored their wom
In June the French occupied the maritime
east of Oran, and soon after the more import
tagannem, on the opposite or eastern side o
zew. Abd-el-Kader made every effort to re
nem, but did not succeed. There was much
the French and the Arabs in the province of
rest of the year. On the eastern coast an
from Toulon, in September of the same year
of troops at Boojeyah, and after several da
against the Kabyles, who disputed every foot
after house, and garden after garden, the
possession of the town, which formed an int
on the coast between Algiers and Bona.

By an ordonnance of the month of Augus
Count d'Erlon was appointed 'governor-gene
possessions in North Africa,' under the dire
of the minister-at-war. An intendant or
department was also appointed, as well as
justice at the head of the judicature. The
this year were of little importance. There w
fighting with the Kabyles in the neighbourh
and with the troops of Ahmed Bey of Co
direction of Bona. The sheik of La Calle,
east of Bona, on the frontiers of Tunis, made
the French. In the west, Abd-el-Kader,
whose authority was now acknowledged by al
from the river Shelif to the frontiers of Maro
an agreement with the French governor of O
acknowledged the supremacy of France, a
ledged by the French as the emir of the
cara, which included the whole western div
of Algiers, with the exception of Oran an
territory, and the other points on the coast w
pied by the French. The Shelif was to be hi
east. A sort of commercial treaty was also co
the emir and the French. This convention
Paris, as giving a political importance to th
which he would take advantage to consolidat
a proper opportunity occurred to turn his
French: and so it happened.

At the beginning of 1835 Abd-el-Kader c
and excited the Hadjoutes and other tribes i
neighbourhood of Algiers to rise against th
himself collected a force of 8000 horse an

ad been trained as regular infantry, in the neigh-
Oran. General Trézel, the French governor of
ed against him, and met him on the banks of the
The Arabs fought well, but gave way at last, and
few miles. General Trézel having lost 240 men,
prudent next day to retire to Arzew on the sea-
he was attacked by the Arabs at the Pass of Makta,
lost his baggage, a howitzer, several caissons, and
ither killed or wounded. This disaster was the most
hich the French had yet encountered in Africa.
ader showed considerable military skill in these
s.

l Clausel, being appointed by the king to succeed
Erlon, resolved on his arrival at Algiers to crush, if
the rising power of Abd-el-Kader. He began by
g a native Bey of Oran, thus exciting a rival to the
his own neighbourhood, He then prepared an ex-
gainst Mascara, a town of about 10,000 inhabitants,
apital of Abd-el-Kader, 18 leagues south-east of
The Duke of Orleans sailed from France to Oran to
y the expedition, which consisted of about 10,000
bd-el-Kader tried to oppose the French on the banks
g, and afterwards at the pass of the river Habrah,
en were overcome by French tactics and discipline.
ithdrew into the interior, leaving Mascara to its fate.
h found Mascara deserted by its inhabitants, and
by the wild Arabs. Being unable to retain pos-
t, Clausel ordered it to be set on fire on the 9th of
1835, after which he marched back to the sea-coast
Mostaganem, whence he returned to Algiers.

llowing January, 1836, Marshal Clausel undertook
nd expedition against the town of Tremecen or
tuated about 100 miles south-west of Oran, near
s of Marocco, and which was now the head-
Abd-el-Kader. The Meshoar or citadel of Tlemsan
a body of Kooloolis, the sons of Turkish soldiers,
the service of the Dey, who had retained posses-
er since the fall of the regency. These men were
s with the Arabs, who considered them as intrud-
ey looked therefore up to the French for support.
h expedition set out from Oran, and after a march
s entered Tlemsan, which Abd-el-Kader had eva-
th all the Moorish inhabitants. The Jews and
received the French with acclamations. A body of
n moved towards the mountains east of Tlemsan,
Emir was encamped, and drove him away into the
Marshal Clausel next marched northward of Tlem-
confluence of the rivers Tafna and Isser, where he
other body of Abd-el-Kader's followers, among
re several thousand horsemen from Marocco who
to join in the Djehed or Holy war which the Emir
imed against the infidels. Clausel, having returned
n, found that the Moorish population had re-entered
He appointed a native Bey, distributed arms among
lis and other partisans of the French, and leaving
rrison in the citadel, returned to Oran with the
of his army. Unfortunately the Marshal, being
exaggerated reports of the wealth of the people of
mposed upon them an extraordinary contribution
illion of francs, leaving three natives, one of whom
ell known Moorish colonel Jussuf, to collect it.
that notwithstanding many acts of exaction and
said to have been committed by these men, they
extract the value of 100,000 francs, chiefly in
nkets. The Marshal being now better informed,
e rest of the contribution, but the conduct of the
lemsan was the subject of severe censure in the
Deputies at Paris. In order to secure a nearer
ion between Tlemsan and the sea-coast, Marshal
blished a fortified camp at the mouth of the river
pying at the same time the little island of Ras-
lies before the æstuary.

turn to Algiers the Marshal marched southward
Kabyles, who had collected in the Little Atlas, and
ted the communication with the town of Medeyah.
tinate fight he forced the pass of Mount Teneah,
Medeyah, where he reinstated the Bey Moham-
d been appointed by the French. Meantime the
neers completed a military road from Algiers to
Having performed all these things, Marshal Clau-
month of April, returned to France to take his
Chamber of Deputies, and defend the system
d pursued in his government of Algiers.

Soon after the Marshal's departure the French of the Tafna camp attempted to relieve the garrison of Tlemsan, but they were met on the way by Abd-el-Kader, who obliged them to retreat with considerable loss to their camp, where they were closely blockaded and suffered much from want of provisions.

This reverse induced the French government at home to send an expedition direct to the mouth of the Tafna, under General Bugeaud, who having learnt on his arrival that Abd-el-Kader had moved in the direction of Oran, marched in the same direction, by the coast road, and relieved the garrison of Oran, which had been closely blockaded for some time. From Oran, Bugeaud began his march to Tlemsan, but on arriving there he found the whole country around stripped of all provisions and cattle by Abd-el-Kader, and he was obliged to return to the camp of the Tafna, about forty miles distant, across the Telgoet Mountains, a road as yet untrod by the French. At the Tafna the French collected provisions from their transports, with which they loaded 500 camels and 300 mules, to supply the garrison of Tlemsan for four months. The convoy set off for Tlemsan escorted by 6000 men. Having crossed the mountains and the Isser, they found, on the 6th of July, Abd-el-Kader strongly posted on high ground above the steep banks of the Sikkak river. The Arab cavalry attacked the French as they crossed the ravine, and obtained a momentary advantage, but they were at last repulsed, when Abd-el-Kader advanced in good order with his reserve of regular infantry. This body of men fired with considerable precision, but being charged with the bayonet by the French, they were routed and driven in their flight down the precipice into the ravine below, where most of them were killed. The native auxiliaries of the French were busy cutting off the heads of the fallen; the French however succeeded in saving the lives of 130 men, and this was the first instance of prisoners being taken in Africa. This was the first approach to a more humane system of warfare, and it led afterwards to an exchange of prisoners between Abd-el-Kader and the French. The defeat of Abd-el-Kader was complete. General Bugeaud entered Tlemsan, provisioned the garrison, and thence retraced his way back to Oran, from whence he embarked for France, where he was promoted to the rank of Lieutenant-General.

Meantime an expedition against Ahmed Bey of Constantina was resolved upon at Paris, and Marshal Clausel returned to Algiers to make his preparations Troops were sent both from Algiers and from Toulon to Bona, where the Duke of Némours, Louis-Philippe's second son, arrived also to accompany the army. On the 13th of November the expedition, about 7000 strong, left Bona, and after two days arrived at Guelma, an old Roman station on the Seyboos river, where a depôt was established for the sick. The troops then crossed the defile of Ras-el-Akba, and attained the high land of Constantina, when they were assailed by a storm of hail and snow, followed by a sharp frost, which reminded some of the veterans of the retreat from Moscow. Many men died, and others had their feet frostbitten. On the 21st of November the army encamped before the walls of Constantina. Marshal Clausel had been told by Colonel Jussuf, whom he had prematurely appointed Bey of Constantina, that the population of the town would open the gates to him; but he found the garrison, consisting of Turks and Kabyles, determined upon defence, and the red flag of Algiers floating over the main battery. He had not the means of investing the place regularly, the snow continued to fall heavily, one-half of the men were ill or were left behind with most of the baggage; and the garrison of the town and the country-people kept the French outposts continually on the watch. After attempting to batter down with his guns the gate of Al-Cantar, Clausel made a desperate effort, on the night of the 23rd, to force that gate and that of Er Rahba, in which attempt a number of French officers and men lost their lives. On the morning of the 24th the French began their retreat in the direction of Bona, followed by the garrison of Constantina, and harassed by clouds of Arab horsemen, and thus they arrived at Guelma on the 28th, from whence they proceeded to Bona. The official statement of the loss of the French stated it at 453 dead and missing, and 304 wounded. The sick were in still greater number. The failure of this expedition produced a very unpleasant sensation in France. Marshal Clausel returned home, and was succeeded by General Danrémont. Upon the whole, this second period of General Clausel's administration was brilliant and bold in a military point of view, and notwithstanding some reverses, it paved the way for the ultimate occupation of the whole state of Algiers by the French.

In the spring of 1837 General Bugeaud was sent again to

Oran on a special mission to treat with Abd-el-Kader in order to prevent him from joining Ahmed Bey of Constantina, against whom a second expedition on a larger scale was being prepared. Fortunately for the French, Abd-el-Kader, an Arab and the representative of Arab nationality, had little sympathy for the Turkish Bey of Constantina, who was besides much inferior to him in character and abilities. Bugeaud, having collected about 10,000 men at Oran, moved forward with a strong escort to the banks of the Tafna, where he had a remarkable interview with Abd-el-Kader, which Bugeaud managed with considerable spirit and address, and at last a treaty was agreed upon and stamped with the seal of the Emir, dated 30th of May, 1837. Abd-el-Kader acknowledged the sovereignty of France, retaining the administration with the title of Emir of the two provinces of Oran and Titteri, with the exception of the towns of Oran, Mostagannem, Arzew, and one or two more points on the coast. Tlemsan was given up to him, on condition of his not molesting the Kooloolis and the other friends of France. On the side of Algiers the boundary-line of the Emir's territories was extended as far as the ridge of the Little Atlas which is nearest to the capital. Medeyah of course was given up to him, but Bledah and Coleah remained in possession of the French. The Emir on his part engaged not to cede any part of the coast-line to any foreign power, and he also engaged to furnish the French with a certain quantity of corn and 5000 bullocks. The treaty was very advantageous to the Emir, who gained a considerable extent of territory. But the French also obtained their object of being for a time relieved of anxiety from the west, so as to be able to turn all their strength towards the eastern province of Constantina, where 20,000 men were assembled at Bona and Guelma towards the beginning of October. General Danrémont took the direction of the expedition, and the Duke of Némours came from France to assume the command in chief. The army met with little opposition in its advance. They formed their batteries on the high grounds which command the town, and effected a breach in the wall. On the 12th of October, the Governor, General Danrémont, whilst surveying the operations, was killed by a cannon-shot, by the side of the Duke of Némours. General Valée assumed the direction of the besieging army, and the town was stormed, but the French encountered a stubborn resistance in the narrow streets; the natives sprung a mine, which killed a number of French soldiers, and a high wall which fell down buried many more under its ruins. At last all opposition was overcome, the surviving part of the garrison escaped or threw themselves down the walls of the town, and the Kasabah, or citadel, surrendered soon after. The Duke of Némours took up his quarters in the palace of the Bey. The soldiers at first committed many acts of violence, but by the exertions of the officers order was restored, the mosques were respected, and the inhabitants were assured of protection. Ahmed Bey had left the town previous to the arrival of the French, and retired into the interior, with a few followers. A native Kaïd, or civil magistrate, was appointed, and a French governor and garrison being left at Constantina, the army returned to Bona. The conquest of Constantina, followed by the submission of many tribes of the interior, was an important event. It established the French power in the centre of a vast inland region, the antient Numidia, extending to the borders of the Regency of Tunis on one side, and as far as the Sahara, or Great Desert, on the other.

In the following year, 1838, the French sent detachments from Constantina in several directions into the interior, to Milah, Djemilah, and Seteef, the antient Sitifis. The province of Constantina was divided for administrative purposes into two divisions, Constantina and Bona, and the former was subdivided into three Khalifats, or Lieutenancies, Sahhel, Ferdjouah, and Mejanah. Native officers were placed at the head of each, to administer justice and collect the tribute from the various tribes. The division of Bona was subdivided into four circles, Bona, Guelma, La Calle, and Edough. At the head of each circle a French military officer, and a native chief under his orders, were placed. The French occupied the maritime station of Stora, the antient Rusicada, the nearest landing-point to communicate with Constantina, and near it they built a town which they named Philippeville.

Meantime Abd-el-Kader was busy in subduing some remote tribes in the south of his province, which would not acknowledge his authority. After the ratification of the treaty, he sent an envoy to Paris, with presents to Louis-Philippe. He then proceeded to Aïn Madhi, about 200 miles inland, on the borders of the desert, the Marabout of which had refused obedience to him. He besieged the place for several months,
and at last took it by capitulation, in January, 183
sent to General Valée a journal of his expedition in
which was written by M. Léon Roches, a young F
who remained two years with the Emir in the capa
secretary. Abd-el-Kader was also forming a cord
tions in the interior, upon which to fall in case of
verses: at Boghar, about 40 miles south-east of Me
Thaza on Mount Matmata, on the left or south ba
Shelif; at Saïda, south of Mascara; Tagdemt, so
Mascara; and Tefzra, south of Tlemsan.

In the spring of 1839 the French took possessio
an intermediate station on the coast between Bo
Stora, in the country of the Kabyles. Another
from Constantina occupied permanently Djemilah
which last became the head town of the new khalif
jana. In September of the same year the Duke
arrived at Algiers, and then proceeded by way of Ph
to Constantina, where he received the homage of
khalifas and sheiks of the province, as well as of th
with the Mufti at their head, and of the various co
and trades of Constantina. He distributed to seve
chiefs the decoration of the Legion of Honour. In
he proceeded with an exploratory expedition in the
of Algiers, by way of Milah, Djemilah, Seteef, Sidi
and then through the Biban or Iron-gates, a remarka
in some places only eight feet wide, between perp
rocks from 800 to 900 feet high, a sort of Chedder c
more gigantic scale, which the Turks had never bee
pass without paying tribute to the neighbouring tribe
French passed without opposition, and then by wa
Hamza and Wadi Zeitoon they returned to Algiers.

There is a well written report, published in 183
Blanqui, of the French Institute, who travelled thr
French possessions in Algeria for the purpose of
into the social and economical condition of the country
port de M. Blanqui, Membre de l'Institut, à l'Acad
Sciences Morales et Politiques, sur la Situation écono
nos Possessions dans le Nord de l'Afrique.' He de
lively terms the failure of the attempts at colonizatio
Metidja plain, and the measures taken by the governo
the towns of Bledah and Coleah, with their splendid
almond, and olive plantations, well irrigated, from the
of the speculators and adventurers who had ruined
of pretty country-houses and hamlets on the Sahel,
land round Algiers; he speaks of the alarming mortali
the French troops in the country; he censures th
the customs; he seems pleased with the bustle and li
he perceived about the town of Algiers, which assume
the appearance of a European city, and he contras
the stillness and solitariness which he found in th
province, at Stora, Philippeville, Bona, and Constant
the road from Stora to Constantina, a distance of 20
there is hardly a hamlet or an Arab douar to
For many a mile there is not a shrub, not a pl
seen. The aspect of this undulating barren and des
gion reminds the traveller of the Campagna near Rom
province of Constantina has been placed under a
administration different from that of the rest of Alger
old civil constitution of the country has been respe
European colonists are forbidden to enter the provin
French rule through the means of native authorities,
hakems, and sheiks, who have received the investitur
office from the governor, and have sworn fidelity
Koran. They retain their former authority, ex
power of inflicting death. They raise the taxes and
which they account for to the French treasury,
one-third of the gross amount for their trouble.
understanding prevails between them and the French
who on their part maintain the strictest disciplin
Blanqui accompanied the Duke of Orleans to Constan
saw all the principal native chiefs come to pay homag
prince. He remarked that their appearance and mann
far superior to those of the Arabs of the province of
The whole population of the town he reckoned at abou
But he thought little of the town itself, which was n
dirty, and decaying. He considers it important on
advanced military post in the interior, but he doubts
it is worth keeping. The whole report is very int
and is one of the best written papers we have seen on
of the country; but as at the time M. Blanqui wrote,
Kader ruled over one half of Algeria, several of the
reflections and suggestions are now out of date, in con
of the events that have happened since. This docu

rted in the appendix at the end of Lesur's 'An-
istorique Universel' for 1839.

mber, 1839, the Arabs of Abd-el-Kader resumed
e against the French, without any previous declara-
They invaded the Metidja, and surprised and cut to
he French colonists, as well as several detachments of
. A subsequent letter of Abd-el-Kader to Marshal
informed him that all the Moslem population had re-
to resume the Holy War against the French. In
had made peace at the Tafna two years before, merely
ge for a fresh renewal of hostilities. All the colonists
uld escape took refuge within Algiers, and the farms
lain were plundered and burnt by the Arabs. On the
these events the French government at home ordered
ments amounting to about 20,000 men, besides horses,
ent to Africa. Meantime several affairs took place
n the French and the Arabs in the neighbourhood of
n. The small garrison of Mazagran, east of Oran,
d by several thousand Arabs, made a most brave defence.
31st of December a large body of the troops of Abd-
r were defeated near Bledah, with considerable loss.

war continued during the following year, 1840, but
the French army of occupation had been raised to
men, no definitive result was attained; the French,
sharp engagements, recovered possession of Me-
d Milianah, which had been given up to Abd-el-
the treaty of the Tafna, and the maritime town of
west of Algiers, was also occupied. In the eastern
several tribes friendly to Ahmed, the expelled Bey
tina, were defeated.

nch government at home resolved on carrying on
ainst Abd-el-Kader with renewed energy, declaring
could be no peace in Africa till that chief was de-
r experience had twice shown that no faith could
in him. With these views, General Bugeaud, who
rly distinguished himself against Abd-el-Kader,
to Algiers to replace Marshal Valée as governor-
December, 1840.

sons of the year are fit for European troops to keep
n North Africa, the spring and the autumn. General
opened the spring campaign of 1841 by marching
scara, which he took and garrisoned, driving Abd-
towards the south. Several remote tribes, having
confidence in the Emir, made their peace with the
The campaign of the autumn consisted in provi-
ascara, and obliging the powerful tribe of the Ha-
bd-el-Kader's chief strength, to emigrate towards the
The winter season put an end to hostilities. It was
enclose the vast Metidja plain, an area of 40 square
ith a ditch, protected by military posts and block-
order to secure the colonists and their farms.

Chamber of Deputies, M. Guizot, the new minister
n affairs, emphatically refuted the insinuations of
rnals, by stating that at no epoch since the revolu-
ly, 1830, France had entered into engagements to
Algiers.

year 1842 the war continued to be carried on by
ugeaud against Abd-el-Kader, who was defeated in
Sikkak Sessef, and several more important tribes,
in, the Sumata, the Shenua, Beni Massaoud, Beni
, were induced to make peace with France. Tlem-
ain occupied, and a French garrison placed in it.
ader however, by his genius and activity, seemed to
esources as he moved rapidly from place to place.
granted by the Chambers for the expenditure of
possessions in North Africa, figured in the budget
the sum of 47,050,984 francs. In November the
umale, one of Louis-Philippe's younger sons, arrived
and joined a new expedition against Abd-el-Kader.
ined considerable successes against several Arab
n thousand men were ordered from France to join
f Algiers.

paign of the following spring, 1843, was marked
ke of Aumale surprising, at the head of a body of
e 'smala' or camp of Abd-el-Kader, whilst the
of his Arabs were absent, on the border of the
h of Tlemsan. Several thousand prisoners were
large booty, including the Emir's papers. The
barely time to escape. The French however lost
ers of rank in this campaign; among the rest Gene-
a Ben Ismail, a brave Arab auxiliary chief, 80 years
head was taken to Abd-el-Kader, who proclaimed
a signal punishment of Heaven upon a traitor to his country. Meantime the French resorted freely to the African practice of making 'razzias,' *i. e.* predatory incursions into the grounds of hostile or disaffected tribes, carrying away their cattle, and often also their women and children. The cattle were sold, and the prisoners taken to Oran or Algiers, until the tribes made their submission. Colonel Jussuf distinguished himself in this kind of warfare. Attended by 1000 men mounted on camels and mules, he started from Medeyah, and plunging into the southern wilderness, he surprised the remote tribe of the Beni Yakoob, and seized an enormous quantity of cattle, which was afterwards distributed among the various garrisons of the division of Algiers. Abd-el-Kader wandered about with a small number of followers near the borders of Marocco. In the month of November his intimate friend and bravest lieutenant, the Khalifa Ben Allal, called Sidi Embarek, the One-eyed, at the head of about 1000 men, met a French division under General Tempoure, and a desperate affray ensued, in which the Arabs were cut to pieces, and Ben Allal, after killing or wounding three of his assailants, was shot dead by a fourth. His head was taken to Algiers, and his body was buried with military honours at Coleah, his native place. After this disaster Abd-el-Kader took refuge within the frontiers of Marocco.

In February, 1844, an expedition from Constantina, under the Duke of Aumale, set out for Biskara, seven days' march to the south, in the Belad-al-Jereed, where the Turks had once a station, and which was occupied by a detachment of Abd-el-Kader's. The French took possession of the district, the troops of Abd-el-Kader having fled, and left a native detachment in the fort. But after the return of the expedition, the friends of Abd-el-Kader surprised the detachment and massacred it. This excursion however made the French acquainted with the road to the great desert.

From his place of retirement within the frontiers of Marocco, Abd-el-Kader not only strove to keep alive disaffection against the French among the tribes of Algeria, but he likewise succeeded in exciting the fanatical population of Marocco itself to a holy war, for the purpose of driving away the infidels from Africa. Some of the emperor's family and court joined in the war-cry. The result has been a war between Marocco and the French. Marshal Bugeaud has added to his former successes that of defeating, at the battle of the Isli, the army of Marocco, which had advanced into that part of the territory of Algiers which lies west of the Tafna river; after which the French seized upon Ouchda, a frontier town of Marocco. These events, and the bombardment by sea of the towns of Tangier and Mogador, induced the emperor Abd-er-Rahman to sue for peace, the principal condition of which is that he will not permit Abd-el-Kader to annoy any more the French in their possession of Algeria. In the debates which took place, both in the British Parliament and in the French Chambers, it was elicited that the French dominion over Algeria has been acquiesced in by Great Britain; France, on its part, having engaged not to extend its conquests beyond the boundaries of the Algerine territories, either on the side of Tunis or on that of Marocco. Perhaps the best security for this is, as was frankly stated by the 'Journal des Débats,' that France will not conquer Marocco for the best of reasons, namely, that she cannot afford to do it. 'France,' observed the Journal, 'is already obliged, in order to retain possession of Algeria, to keep there an army of nearly 100,000 men, and to spend some 40,000,000 francs every year, and she would require double that contingent in order to effect the conquest of Marocco. It will take many years of peace before the revenue of Algeria can be raised so as to cover its expenditure, and it is even very doubtful whether it will ever be able to do that.' In a political point of view, however, the possession of Algeria is undoubtedly of considerable importance to France. Mankind at large, and the nations that border on the Mediterranean in particular, have derived one great advantage from the French conquest, namely, the extirpation of a nest of pirates and the final abolition of Christian slavery.

The high administration of the 'Algérie,' or State of Algiers, is by the king's ordonnances managed as follows:—A governor-general, who is a military officer of high rank, has the supreme command of the troops, and is also at the head of the civil and political administration. He is under the orders of the minister-at-war at Paris, where a department of the War Office is especially engaged with the affairs of Algiers. The governor-general is assisted in his functions by a council of administration, consisting of the director of the interior, the commandant of the naval force on the Algiers station, the military intendant, the attorney-general, and the director of the finances. A secretary-general of the government attends the sittings of the council.

The director of the interior has under him sub-directors at Oran, Bona, and Philippeville. Algiers, Oran, Bona, and Philippeville have municipal councils and maires. In the other towns, as at Constantina, there are civil commissaries, mostly natives, styled Hakhem.

The country is divided into three provinces. 1. Algiers Proper, which includes also the old division or province of Titteri. 2. Oran. 3. Constantina and Bona. The principal military stations are:—in the province of Algiers—Algiers and the neighbouring forts, Bledah, Medeyah, Milianah, Coleah, Shershel, and Boojeyah. In the province of Oran—Oran, Mostagannem, Arzew, Tenez, Mascara, El Esnam, Tlemsan, Meserghin, Mazagran, Tiaret. In the province of Constantina—Constantina, Seteef, Bona, Philippeville, Guelma, Jijeli, and La Calle. Algiers, Oran, Constantina, and Bona have each a considerable garrison and staff. The naval stations are—Algiers, Oran, with the fine bay of Marsa-el-Kebir, Bona, Shershel, and Stora.

For the department of justice, there are courts in the first instance at Algiers, Oran, Bona, and Philippeville. Appeals are made to the Royal Court, which sits at Algiers. There are justices of the peace at Algiers, Bledah, Bona, Oran, Philippeville, and Constantina. Algiers has a tribunal of commerce.

The public instruction is under an inspector. The establishments for instruction are—a college at Algiers with 15 professors; gratuitous courses of Arabic, both vulgar or oral, and written; communal schools; a museum, and a library. There is a Roman Catholic bishop of Algeria, and there are consistories for the Protestants at Algiers and Oran.

The European inhabitants, not military, settled in the various towns of Algeria, amounted in 1843 to about 60,000, and they are increasing rapidly by fresh arrivals. Since 1841 a number of villages have been built on the Sahel, or table-land round Algiers, each of which contains from fifty to sixty families of French colonists, chiefly emigrant farmers with a small capital. The government has granted them allotments of ground, on condition of their cultivating them and building their own houses. These villages have been surrounded by a ditch and towers, thus forming a chain of fortified outposts round the capital. Each village has its fountain, its church, a town-house, and a school. Similar villages have been built by private individuals near Bledah and in other places. At Tenez on the sea-coast, about 90 miles west of Algiers, a new European town has been constructed outside of the old Moorish town. From Tenez a road has been made to Orléansville, an inland colony of 500 or 600 inhabitants, with a military garrison. More to the east is Miliana, a town built on the declivity of Mount Zakar, more than 2000 feet above the sea, which was ruined in the war against Abd-el-Kader, but has been since restored on a much improved plan, and is become an important garrison town.

Marshal Bugeaud stated lately at a public dinner given to him by the merchants of Marseille on his return from Algiers, that tranquillity and security prevail over the greater part of Algeria, that the public revenue has risen to twenty millions of francs, and that the European population amounts to 75,000 individuals, and is daily increasing. It appears by the newspapers, that in the budget for 1845-6, just laid before the French Chambers, the receipts of Algeria are estimated at six millions and a half of francs, and the expenses of the war department are estimated at 74,465,527 francs, for 60,000 men and 13,896 horses. It appears that one half of the emigrants to Algeria are natives of France, and the rest are Spaniards, Germans, Italians, and Maltese. A regular communication by steam-boats has been established along the coast, between Algiers and Bona on one side, and Algiers and Oran on the other. A diligence runs between Algiers and Bledah in the interior.

(*Guide du Voyageur en Algérie, contenant l'Annuaire de* 1844 *et les Lois, Ordonnances, et Arrêtés concernant la Colonie*, a very well written and instructive compilation; Lesur, *Annuaire Historique*, 1830—43; Rozet, *Voyage dans la Régence d'Alger*, 3 vols. 1833; *Moniteur Algérien*; P. B. Lord, *Algiers and the other Barbary States*, 2 vols. 8vo. 1835; and the other works quoted in the course of this article.)

ALGORITHM, a corruption from the Arabic, the root being a word which means calculation, or at least refers to calculation or reckoning. When the Indian numerals were introduced from the East, this word came with them, and the new figures were denominated (by Chaucer, for example) *augrime* (or algorithm) figures. The word is tolerably well naturalized among the French mathematicia
system of notation: thus there is an algo
and an algorithm of the differential calculu
been used by English writers, but our lang
it; the word *notation* does just as well.
times lead to misconception: those who a
them find them not only spelt in different w
different meanings. Daniel Fenning (*Young*
panion, 1750) tells us that some writers a
tricate, that it is almost impossible to learn
them, much less the *algorism*. In a note
the first of these hieroglyphics means the
the second their application to practice.
matical dictionaries define the word algorit
real imported sense, namely, as meaning
arithmetic.

ALIEN. On the 6th of August, 1844,
(7 & 8 Vict. c. 66) 'to amend the law rela
repeals the clause of 1 Geo. I. c. 4, which
Naturalization Bill should contain clauses t
person naturalized should be a member of
or of either House of Parliament, or hold
military, or be capable of holding grants
lands, tenements, or hereditaments, either
by any person in trust for him. By the 7
person born out of her majesty's dominion
is a natural-born subject of the United Ki
capable of taking either real or personal es
chase, or inheritance; and an alien who
friendly state may take and hold every
property, except chattels real, as fully and e
born subjects. The subject of a friendly
the purpose of residence or occupation, ei
his servants, hold lands, houses, or tenem
not exceeding twenty-one years; and m
rights, remedies, exemptions, and privilege
of voting at elections for members of parlia
a natural-born subject. An alien woman m
born British subject becomes naturalized
The privileges conferred upon aliens by t
by referring to the former disabilities o
P. C.] Such of the provisions of the follo
inconsistent with the act 7 & 8 Vict. are r
Will. III. c. 2; 1 Geo. I. sess. 2, c. 4;

The Alien Act of 1844 also contains a n
naturalization of aliens. An alien who co
United Kingdom with a view to settle he
lowing course, obtain nearly all the right
subject. He is required first to present
secretary of state, containing a statement
sion, trade, or other occupation; the leng
resided in this country, and the grounds o
obtain any of the rights of a British subjec
a certificate, which must be granted befor
be taken. The certificate granted by th
recites such parts of the memorial as,
tion, are found to be true and material, a
the applicant 'all the rights and privileges
except the capacity of being a member of
or a member of either House of Parliame
rights and capacities (if any) specially ex
such certificate.' The certificate must
Court of Chancery, and within sixty day
memorialist must take and subscribe an oat

The course of proceeding to be adopted
to become naturalized is to be regulated,
concerned, by the secretary of state, and
is to be fixed by the lords of the treasury
ized before the passing of 7 & 8 Vict. c.
resided in this country for five successive y
all the rights conferred by the new act.

The act at present in force for the regis
the 6 Will. IV. c. 11, which repealed an a
(7 Geo. IV. c. 54). Masters of vessels ar
parts are to declare what aliens (mariners
sel excepted) are on board or have landed
for omission or for false declaration, of 20*l*
alien omitted. Every foreigner on landing
diately to exhibit any passport in his pos
officer of customs at the port of debarkation,
either verbally or in writing, his name, b
country he has come from, under a penalty, f
of 2*l*. The officer of customs is to register

rtificate to the alien, and transmit a copy of the de- s to the secretary of state. On leaving the country s is required to transmit to the secretary of state the te granted him on landing. The act does not affect ministers or their servants, nor aliens under fourteen The proof of non-alienage lies on the person alleged n alien. Under 7 Geo. IV. c. 54, aliens were required ent themselves at the Alien-office; but this is no longer ry.

registration clause of 6 Will. IV. is generally dis- ed by foreigners, and is never enforced, for there is no on in the act for recovering the penalty. In 1842, out 11 foreigners who were officially reported to have , 6084 only registered according to the act; but in the ear, out of 794 who landed at Hull, only one regis- at Southampton, out of 1174, not one; and of those anded at London, not one-half. At Liverpool no return ept of the number of foreigners who landed, and there instance of one who registered. There are two alien at the port of London, and one at Dover, but at other the business is done by the officers of customs.

r the act 7 Geo. IV. c. 54, the number of foreigners rived and departed during the year was ascertained; y said that the papers have been destroyed. The nder the census of 1841 do not distinguish foreigners tish subjects born in foreign parts. The total num- eigners and British subjects born abroad, and who lent in Great Britain on the 6th of June, 1841, was f whom 38,628 resided in England, and 19,931 of r were returned in the counties of Middlesex and The number of foreigners naturalized previous to the 7 & 8 Vict. did not on an average exceed seven or r, and the number who applied for letters of deniza- t exceed twenty-five annually.

ENTUS, CI'NCIUS. [Cincius Alimentus,

N, REV. ARCHIBALD, was born in 1757, in , of which city his father, Andrew Alison, was a In 1772 Archibald was sent to the University of whence he proceeded, with an exhibition, to Balliol Oxford, where he matriculated, Nov. 9, 1775. He gree of A.M., and that of LL.B., March 23, 1784, year he entered into holy orders, and married the of Dr. John Gregory of Edinburgh; he was soon appointed to the curacy of Brancepeth, in the Durham. He obtained the perpetual curacy of Shropshire in 1790, a prebendal stall in Salisbury in 1791, the vicary of Ercall in Shropshire in 1794, ing of Roddington in Shropshire in 1797, amount- ther to about 800*l*. In 1800 he was invited to be- er minister of the episcopal chapel, Cowgate, Edin- He accepted the invitation, and continued to officiate gregation, which afterwards removed to York Place, when severe illness compelled him to withdraw from mance of his public duties. He died in 1839, at the He was much respected for his private character, bits of intercourse with the most distinguished literary Edinburgh, and was much admired as a preacher.

v. Mr. Alison was the author of 'Essays on the d Principles of Taste;' 'Sermons, chiefly on Particu- ions,' 2 vols. 8vo., 1814, 1815, and several editions d 'A Memoir on the Life and Writings of the Hon. r Fraser Tytler, Lord Woodhouslee,' in the 'Trans- the Royal Society of Edinburgh, 1818.

rary reputation chiefly depends on his 'Essays on ich were first published in 1790, but which made ession on the public till the second edition, with ad- me out in 1811, when the work became the subject miastic article by Jeffrey, in the 'Edinburgh Re- it then became popular; its popularity however een on the decline. The work consists of two first 'Of the Nature of the Emotions of Sublimity ;' the second 'Of the Sublimity and Beauty of l World;' the whole work is divided into chapters, d parts, with much appearance of philosophical ut with little either of comprehensiveness or preci- treatment of the subjects. His notion of sublimity metimes he seems to understand the word in the ceptation, as supereminent grandeur of any kind; n the sense in which it is used by Longinus, as lculated to produce a powerful emotion. The f his notion of beauty may be more easily ex- , as the term is generally applied to any object of nature or art calculated to produce a pleasing feeling in the mind, the causes of the emotion of beauty are necessarily multifarious, and subject to no general rule: the forms, sounds, and colours of nature, for instance, having laws respectively appropriated to each, on which the feeling of delight depends, and which are applicable to all minds, while, in works of art, the causes of delight are perhaps still more varied, having reference not only to the invariable laws of nature, but to special circumstances connected with the art and artist. Alison does not treat of taste as an appreciating and discriminating faculty of the mind depending on the judgment, or as the judgment applied to the fine arts and to the objects and scenes of nature about which those arts are conversant, but as an emotion caused by objects or scenes calculated to excite certain associations of ideas and trains of thought, which, according to him, are the real causes of the emotion. His views are indeed little better than a series of opinions formed with little power of thought, and falsified in many parts by the application of the doctrine of association, which, however true as applied to particular cases, is not true when applied as the primary cause of the emotions of sublimity and beauty, and still less true as the leading principle of taste itself. His style is not unpleasing, but it is very diffuse, and deficient in distinctness and precision.

(*Biog. Dict.* of the Society for the Diffusion of Useful Knowledge; *Gent.'s Mag.*, Sept. 1839.)

ALKALIES — *Medical Properties of.* These bodies, once considered to be simple, are now known to be (with the exception of ammonia) combinations of oxygen with a metal. They have a great affinity for water, and very readily absorb watery vapour from the atmosphere. Their chief characteristic is the facility with which they unite with acids to form salts, compounds which are readily resolved by galvanism, when the acid goes to the positive pole, the alkali to the negative. They also change many vegetable infusions to a green colour, and restore to their primitive hue those which have been reddened by an acid. Their power in this respect was formerly held to be indicative of the presence of an alkali, but as it is shared by many other bodies, it is by no means conclusive. (Faraday.) Those combinations of an acid with an alkali which did not affect the colour of vegetable infusions were termed *neutral* salts; if they reddened infusions of a blue colour, this was attributed to the acid being in excess or larger proportion, and they were termed *acid* salts; while if they affected them as alkalies commonly do, they were termed *basic*. All these terms are objectionable, since the actions depend more on the power than the quantity of acid or the base, as the alkali was called. More accurate phraseology now prevails among chemists. Alkalies, strictly speaking, are only three in number, viz. soda, potassa, and ammonia. These are termed inorganic, to distinguish them from the organic substances, which are more properly called Alkaloids [P. C. S.], or Organic Alkalies. Strontian and barytes have sometimes been deemed alkalies, as well as magnesia and lime: these last are frequently termed alkaline earths. The alkalies are possessed of the alkaline attributes in the highest degree, are very acrid and caustic, readily soluble in water and alcohol, and form with carbonic acid salts very soluble in water: the alkaline earths are less caustic, sparingly soluble in water and alcohol, and form, with one proportion of carbonic acid, salts which are almost insoluble in water; but when carbonic acid is present in excess, the base is nearly completely dissolved, a circumstance which explains their presence in many mineral waters when they first issue from the spring, but from which they are precipitated on exposure to the air. An imitation of this state in respect to magnesia has greatly facilitated the exhibition of it by forming a perfect solution of it. This is best done by putting a quantity of magnesia with water into a strong bottle, and introducing a sufficient amount of carbonic acid, when it is to be immediately corked and sealed.

It is impossible to exclude magnesia and lime from consideration when treating of alkalies, but the remarks which follow are chiefly intended to apply to soda, potassa, and ammonia. The two former are termed *fixed*, the latter *volatile*: soda is likewise termed the *mineral* or *fossil* alkali; while potassa is termed the *vegetable* alkali, or sometimes merely *kali*. The salts formed with alkalies are apt to *effloresce*, and resolve the crystals into the state of powder, or to absorb water from the air, and *deliquesce* or become liquid.

Alkalies in a pure state are extremely caustic, destroying the tissues with which they come in contact, and forming an escar which is deep if the alkali be confined, extensive and superficial if allowed to spread. This seems to depend on their strong affinity for water: hence they act as violent corrosive poisons, and are never used in a pure state, save in surgery to open abscesses or to form caustic issues. Diluted with oils they constitute rubefacients, particularly ammonia. Their causticity is also greatly lessened by combination with carbonic acid, and is more subdued by an excess of the acid; hence bi-carbonates are less caustic than sesqui-carbonates, and these last than carbonates. The carbonic acid is apt to fly off on exposure to the air, so that they regain their causticity. Carbonate of ammonia will altogether disappear if not kept in a well stopped bottle; this tendency is one source of its utility when used as smelling salts.

When suitably diluted with water or by combination with carbonic acid, so as to be safely applied to the tongue, alkalies have a taste peculiar, and to most persons unpleasant, which is designated *alkaline*, for want of anything similar to which to liken it. Ammonia and its carbonates are likewise pungent. They exercise an immediate influence on the fluids of the mouth and alimentary canal, as far as they pass unchanged. They neutralize all acids they meet with in their course, and render the mucus, and perhaps some other secretions, thinner and more watery. That they are readily absorbed into the circulating mass, on which they have a marked influence, is certain; but they are for the most part speedily eliminated, the kidneys appearing to be the channels by which they are thrown out of the system. Many alkaline compounds, as well as the uncombined but diluted alkalies, increase the secretion of urine, and change its nature if long persevered in, altering it from an acid to an alkaline state. This is particularly the case when the compound is one of carbonic acid, or of a *vegetable* acid with the base, all of which are decomposed in transitu, as first remarked by Sir Gilbert Blane, and produce on the urine and the system generally ultimately the same effects as the pure alkalies. The alkalies possess a power of rendering albumen soluble: unboiled white of egg is an albuminate of soda. The albumen of the blood is rendered more fluid by alkalies; hence in excess they impair the plastic power of that fluid.

These facts seem all that are requisite to form a correct estimate of their therapeutic powers and employment. Their caustic and rubefacient properties fit them for external use. Their internal employment is regulated by a variety of indications, but it is chiefly as antacids, or to counteract acidity in the stomach and primae viae, and as diuretics, and to dissolve calculi in the kidneys or bladder, and as refrigerant or cooling medicines in inflammatory diseases, that they are used. Many persons, soon after food has been taken into the stomach, are distressed with heartburn and other signs of indigestion, and either have the urinary secretion in an unhealthy state, or, if they be of a gouty disposition, have frequent attacks of gout. Such persons feel relief by taking some alkaline medicine after meals, or have recourse to them because others use them. When uric or lithic acid exists in the urine, such means may be proper; but this point should be ascertained before having recourse to measures which, when not appropriate, are far from being harmless. Some acid, either hydrochloric or acetic, is essential to sound digestion: to neutralize these is to retard and disturb that process. Other acids, especially lactic, in bilious persons and those who use sugar or saccharine fruits in excess, occur, and require to be obviated; but the proper time for taking, as well as the proper quantity to be taken, requires much judgment. Assuming that some alkali is proper, Sir B. Brodie thinks from three to four hours after each of the principal meals, especially dinner, the most suitable time. (*Lectures on the Urinary Organs*, 3rd ed. p. 203; and *Medical Gazette*, vol. xxiii. p. 151.) Dr. Prout makes a similar remark with respect to alkaline mineral-waters. A variety of circumstances regulate the alkali to be selected. From their greater causticity, the pure alkalies can rarely be persevered in sufficiently long, even when taken in such bland vehicles as veal-broth. The alkaline carbonates are better borne, and bi-carbonate of potass more easily than carbonate of soda. Their unpleasant taste constitutes an objection with many: this is in some degree obviated by giving them in the condensed form recently devised by Mr. Brockedon, or in an effervescing state with an excess of alkali, as recommended by Sir Gilbert Blane. If taken unnecessarily or persevered in too long, much evil is done: not only is an alkaline state of urine induced, with a deposition of the phosphates, as indicated by a white sabulous sediment, or an iridescent pellicle on the surface of the urine, but much general debility is caused.

' Other ill consequences follow the too liberal use of
they alter the quality of the blood. After some
patient is liable to petechiæ; he perspires too easily
low-spirited, and less capable than when in health
exertion.' (Brodie, *l. c.* p. 202.) As effervescin
draughts, made with a *vegetable* acid and some al
bonate, are much used at the beginning of in
diseases for their reducing and refrigerant effect
caution is requisite lest they be pushed too far.
needful in the case of soda-water (when it re
soda, and not merely carbonic acid, as is frequentl
citrated alkali, imperial and other drinks much u
weather. Scrofulous persons can least of a
against the abuse of these, yet for such are they
most employed. Weak vegetable acids will be
beneficial.

ALKALOIDS—*Medical Properties of*. The
which modern chemistry has made known, are te
times *vegetable* alkalies, as being hitherto found
vegetables, and also *organic* alkalies, from requi
power to effect their formation; but the name giv
above is the most appropriate. They possess al
perties in the lowest degree, and are either tastele
a bitter acrid taste, existing generally in a solid, m
talline form; some however are amorphous (Aconi
casionally in a liquid state (Conia and Nicotina),
very volatile, and readily undergoing decomposition
evolution of ammonia, at a moderate temperature. T
in which they differ most from the common alkalies
Ammonia) is in having nitrogen in their compositio
them (Caffeina) being perhaps the most highly nitr
compound known. Sometimes one only exists in
sometimes several in the same plant, *ex.* opium. (
they are combined with an acid; most frequentl
peculiar acid. Many of them are with difficulty s
water, more so in alcohol; they rarely completely
acids, but the salts which they form are more solu
the bases; hence various of their salts are used in
in preference to the primitive article.

Their great characteristic is the extraordinary ac
of them have on the human system in a very small
indeed several of them are, in very minute quantit
poisons. 'No remedy, devoid of nitrogen, possess
sonous action in a similar dose; but it is certainl
direct proportion to the quantity of nitrogen. So
picrotoxia, which contain least nitrogen, are powerfu
Quinia contains more nitrogen than morphia.
and theobromina, the most highly nitrogenized of
table principles, are not poisonous.' (Liebig, *Ani
siology*, 1st ed. p. 177.) This author conjectures
owe this great power to having a composition ana
that of the nerves and brain; but points so hypothe
not be discussed here.

Having been first detected in plants long used as
(Cinchona), it is chiefly among medicinal plants
have been sought for and found. By many they are
as the active principle of these, and their extraction
the great advantage of enabling medical men to a
their remedies in a smaller bulk and more conveni
As the most important of them have been already t
under the names of the plants which yield them,
necessary to notice any of them further here, except
that chemists have recently rendered a great service
ing a neutral sulphate of quinine, which is much m
ble than the disulphate.

ALLAN, DAVID, called the Scottish Hogarth,
at Alloa in Stirlingshire, in 1744, where his father w
master. The choice of his profession was partly ow
accident; he burnt his foot, and while he was bein
at home, having nothing else to do, he amused him
drawing with a piece of chalk upon the floor, an a
he got so much attached to, that when he recovered
very great objection to going to school. But he soon
a happy release from this obligation, for his old sch
turned him away from the school, for making a cari
him punishing a refractory boy. The caricature
have had merit, and Mr. Stuart, collector of the c
Alloa, was so much struck with it, that he reco
Allan's father to send him to the academy of Ro
Andrew Foulis at Glasgow, to learn to become a
He was according apprenticed in 1755, his eleventh
Robert Foulis, to learn drawing, painting, and e
Allan remained at this academy nine years, and wh

he had the good fortune to be introduced by
as a native prodigy to Erskine of Mar, o
he was born, and by whom he was generously
pensioner to prosecute his studies at Rome. At
was introduced to Gavin Hamilton, who was of
to him in his professional pursuits. Allan
worthy of the generous patronage he enjoyed:
however while at Rome which he never
rwards.

first a silver medal for a drawing in the Aca-
Luke, and afterwards the gold medal for paint-
subject was the legend of the Corinthian maid
profile of her lover around his shadow cast by
the wall. The picture was well painted, and a
of it by Cunego spread Allan's reputation
and his praises reached even his own
it was however the first and last good picture
His subsequent works were distinguished
feeling, but in execution, whether as paint-
ings, they are very inferior.

two other pictures at Rome, the Prodigal Son
Cathcart, and Hercules and Omphale for Erskine
he made also four humorous designs illustrating
Carnival, which through Paul Sandby's prints of
very popular, and they gained Allan a con-
reputation for broad humour. But he no more
the title of the 'Scottish Hogarth,' which for these
other similar designs he obtained in Scotland, than
pictures would warrant his being called the
Raphael. 'He is among painters,' says Allan
'what Allan Ramsay is among poets—a fellow
humour, and excelling in all manner of rustic
deficient in fine sensibility of conception, and
with lofty emotion or high imagination.'
Allan visited London, which however he left for
after practising there for a short time as a portrait
After the death of Runciman in 1786, Allan suc-
as master of the Trustees' Academy, which office
ten years, until his death in 1796. He left a
ghter; the former went in 1806 as a cadet to

popular designs are his Twelve Illustrations of
entle Shepherd, which he engraved himself in aqua-
ublished with an edition of the poem, with some
marks, as a sort of apology for the humbleness of
his designs. He made also some designs for the
of Burns, who complimented the painter in his
friend Thomson, on more than one occasion.
found fault with Allan's 'stock and horn,' a rude
ument which he put into the hands of some of
Burns offered to send him a real one, such
herds used in the braes of Athol. 'If Mr. Allan
Burns, 'I will send him a sight of mine, as I
self to be a kind of brother brush with him.
poets is nae sin;" and I will say it, that I look
and Mr. Burns to be the only genuine and
of Scottish costume in the world.'
ever did not think that Burns's stock and horn
provement upon his own; he said it was only fit
and roaring.'
letter, Burns, speaking of Allan's illustrations
ks, says, 'Woo'd and married an' a' is ad-
grouping is beyond all praise; the expression
conformable to the story of the ballad, is ab-
tless perfection. I next admire Turnimspike.'
these designs which were successful were the
Man,' 'Maggie Lauder,' and 'John Anderson
Allan made also several designs of another
the Escape of Queen Mary from Lochleven
ral homely scenes, as the Scotch Wedding, the
ance, the Repentance-Stool, &c., and some
cotch scenery.
am, *Lives of British Painters*, &c.)

TION, ECCLESIASTICAL, is the term
he first plea in testamentary causes: in crimi-
ngs (ecclesiastical) the first plea is called Ar-
enary or ordinary causes the first plea is called
This first plea is analogous to a declaration at
or to a bill in equity. The term Allegation
to every subsequent plea, in all causes. The
en in by a defendant is called a Responsive
the plaintiff's answer to that is called a Counter
The pleadings are not usually carried beyond this step. Besides these allegations, either party in the case is allowed to except to the credit of any witness upon matter contained in his deposition. These exceptive allegations, when admitted, are proceeded upon in the same manner as other pleas.

(Phillimore's ed. of Burn's *Eccl. Law.*)

ALLEN, JOHN, M.D., a writer on subjects connected with metaphysics, history, and physiology, was born in January, 1770, at Redford in the parish of Colinton, near Edinburgh. The small domain of Redford, situated on the slope of the Pentland hills, was his paternal property, and the mansion-house still attests the moderate but substantial wealth of his ancestors. He studied at Edinburgh, where he took a degree in medicine in 1791. He soon afterwards connected himself with those movements in Scotland for the furtherance of parliamentary reform, which called down the vengeance of the government. In 1795 he published 'Illustrations of Mr. Hume's Essay concerning Liberty and Necessity,' in answer to Dr. Gregory of Edinburgh, by a Necessitarian. This small tract is in many respects characteristic of his subsequent more distinguished works, in the felicity with which it adopts a broad and comprehensive view, as well as in the clearness with which it adheres to one unbroken line of reasoning, and keeps clear of divergencies and incidental questions. It is an exposure of the fallacious assumption that Hume's theory of cause and effect did not make allowance for unseen causes. This celebrated theory had been held to contain a principle not realized in nature, that in all cases the same apparent cause is followed by the same apparent effect. Gregory's attack was made in diagrams, and Dr. Allen's answer was in the same form, showing that Gregory's reasoning was accurate, but his description of Hume's opinion erroneous. In 1801 he translated from Cuvier, whose friendship he enjoyed, 'An Introduction to the Study of the Animal Economy.' It appears to have been about the commencement of this century that he formed an intimacy with Lord Holland, with whom he continued to reside until that nobleman's death. The connection between them appears to have rested on the foundation of common tastes and opinions and mutual esteem, not on patronage on the one hand and servility on the other. After the peace of Amiens Dr. Allen accompanied Lord and Lady Holland through France and Spain, and resided with them in the latter country until the year 1805. He made large collections relating to the past history of Spain, and to its social and political position. He had formed high hopes of the prospects of the Spanish people—hopes destined to be bitterly disappointed, as each effort to regenerate them sunk under anarchy or despotism, and the mortifications to which his zealous feelings in their favour were exposed, appear to have in his latter days damped his ardent admiration of free institutions. He became an extensive contributor to the 'Edinburgh Review,' on subjects chiefly connected with the British constitution, and with French and Spanish history. Forty-one articles in that periodical are attributed to him, and his researches in a great measure serve to establish and characterize its opinions on constitutional questions. His earliest papers were on Spanish and South American subjects, and among those attributed to him are—Bourgoing, 'Tableau de l'Espagne Moderne,' October, 1804; Helms' 'Travels from Buenos Ayres,' October, 1806; 'Mercurio Peruano de Historia,' &c., January, 1807; Molina's account of Chili, July, 1809; Laborde's View of Spain, October, 1809; Humboldt's 'Essay Politique sur la Nouvelle Espagne,' April, 1810, and November, 1811. The earliest article on constitutional subjects attributed to him is that on the Regency question, May, 1811. In the number for June, 1816, an elaborate essay on the constitution of parliament, full of original investigation, is believed to have been from his pen. He wrote in the same periodical some papers on the History of England by Lingard, which occasioned a pamphlet controversy with that author, chiefly relating to the massacre of St. Bartholomew, the authorities for which he charged Lingard with having referred to at second hand. The latest article which he is supposed to have contributed to the Review is that on Church Rates, October, 1839. He wrote the History of Europe in the Annual Register for 1806; and in 1820 a 'Biographical Sketch of Mr. Fox.' In 1830 he published a small but valuable constitutional work, called an 'Inquiry into the Rise and Growth of the Royal Prerogative in England.' He maintains that by the older constitution public acts were not performed by the English kings until after their coronation; and it is a remarkable circumstance of a general constitutional doctrine standing the test of minute chronological inquiries, that while Dr. Allen states the reign of Richard I. to be the only exception to this practice, Sir Harris Nicolas, in his 'Chronology of History' (p. 276), shows that in Rymer's 'Fœdera,' and other collections of documents, the regnal years of that reign are ante-dated by a year. Dr. Allen published several other pamphlets, some of them on subjects of comparatively temporary interest. He was a member of the Record Commission, and the only other office he ever held was that of under-secretary of the commissioners for treating with America in 1806. He died April 3, 1843. He left his medical books and MSS. to his early friend Dr. John Thomson, emeritus professor of pathology in the University of Edinburgh—and his other MSS. he bequeathed to Colonel Fox. We believe it is in contemplation to print a collected edition of his works. His character has been eloquently drawn by his friend Lord Brougham, in the third series of the 'Historical Sketches of the Statesmen of the time of George III.,' p. 342-348.

ALLEN, WILLIAM, was born on the 29th of August, 1770. His father, a silk-manufacturer in Spitalfields, and a member of the Society of Friends, intended to bring him up to his own business, but having at an early period shown a predilection for chemical and other pursuits connected with medicine, he was placed in the establishment of Mr. Joseph Gurney Bevan, in Plough-court, Lombard-street, London, where he acquired a practical knowledge of chemistry. He eventually succeeded to the business, which he carried on in connection with Mr. Luke Howard, and acquired great reputation as a pharmaceutical chemist. About the year 1804 Mr. Allen was appointed lecturer at Guy's Hospital on chemistry and experimental philosophy, and he did not wholly retire from this institution until 1827. He was elected a Fellow of the Royal Society in 1807, and the Society's 'Philosophical Transactions' contain accounts of several of the more important of his chemical investigations, which were carried on in conjunction with his friend Mr. Pepys. They established the proportion of carbon in carbonic acid, which was different from that adopted at the time in all systems of chemistry; and they also demonstrated that the diamond was pure carbon. The 'Philosophical Transactions' for 1829 contain a paper by Mr. Allen, based on elaborate experiments and calculations which he had made on the changes produced on atmospheric air and other gases by respiration. Mr. Allen was mainly instrumental in establishing the Pharmaceutical Society, and he was the president of this institution at the time of his death. Besides his public labours as a practical chemist, astronomy was a private study which he pursued with much delight in his hours of relaxation. Many years before his death, Mr. Allen purchased an estate near Lindfield, Sussex, and withdrew from business. Here, while still zealously engaging in public schemes of usefulness and benevolence, he carried out various philanthropic plans of his own, which reflect the highest honour on his character. The commodious cottages which he erected on his property, with their combination of comfort and convenience, were at once proofs of his kindness of heart and the enlightened benevolence which sought by this means to improve and elevate the character of the rural population. To each cottage an ample allotment of land was attached. He was if possible still more anxious to make provision for the education of the young. In 1825 he established day-schools at Lindfield, and in 1834 a department was added for boarders. The school-buildings and premises comprised a building for boarders, twenty of whom could be accommodated, school-rooms for boys and girls, an infant-school, workshops, outhouses, playgrounds, and there were about three acres of land cultivated on the most approved system by the boarders, who also took a part in household work. The subjects taught were land-surveying, mapping, the elements of botany, the use of the barometer, rain-gauge, &c., and to encourage the scholars to advance in their studies beyond the ordinary routine of common day-schools, there was a good library with various scientific and useful apparatus, including a galvanic battery, an electrical machine, an air-pump, a magic-lantern (used as a magnifier for illustrating vegetable physiology), and a representation of the solar system. Mr. Allen himself delivered lectures periodically to the boys on subjects connected with their probable future avocations. Soils and manures were analyzed, and models were exhibited showing the laws of friction on common roads, and the plans and mode of working various machines. This brief notice of the institution will be sufficient to show the intelligent spirit which directed Mr. Allen's benevolent efforts. He died at his house near Lindfield, December 30, 1843. (*Pharmaceutical Journal* *Transactions* for February, 1844; *Minutes of Committe* *Privy Council*, 1842-3, 'Lindfield School,' p. 551.)

ALLO'RI, the name of two distinguished Italian painte father and son, though different in style.

The father, Alessandro Allori, was born at Florence 1535, and was brought up by his uncle Angelo Bronzino, li wise a very distinguished painter. Allori, from his conn tion with his uncle, was also frequently called Bronzino, he sometimes wrote the name upon his pictures. He one of the most distinguished painters of the anatom school, and was a devoted admirer of Michelangelo; he appropriated nothing more of that great master than affected display of anatomy, which Allori seems to have c sidered the greatest quality in art; in 1590 he publishe treatise upon anatomy for the use of artists. He died 1607, and his portrait by himself was placed in the Flo tine gallery of painters' portraits.

Allori's works, both in oil and fresco, are numerous many on a large scale; his greatest work is the M Chapel in the church of the Annunciata, painted in 1582. He has painted there, a Last Judgment, disputing with the Doctors, and Christ driving the m changers from the Temple. In the second he has intr the portraits of Michelangelo and Giacomo da Ponto their own costume, besides several other portraits of his c poraries. He was an excellent portrait-painter, and stantly introduced portraits of his friends into his h pieces.

The son, Cristofano Allori, born at Florence in 15 a better painter than his father, whose style he abom he used to call him a heretic. He studied with Gre Pagani, and rivalled that painter in richness of colour, surpassed him in delicacy of execution. But he was idle fastidious, and his works are scarce. In execution he equal to anything, and he had of course a corresponding in copying. He is said to have made some copies of C reggio's Magdalen, with slight alterations in the backgro which now pass as duplicates by Correggio; he gener made a slight variation in the background: the origin this work is at Dresden; that which the Roman governm recently forced Vallati, an animal painter, to return to its mer owner, from whom he had purchased it in a disfigured some months before for 15 scudi, may be one of these co by Allori. It seems it had been carefully but badly p over, probably during the French revolution, to preserv The fact was forgotten by or unknown to its present sessor, a few years ago, and he sold it as a picture of no va Vallati, who bought it, discovered in cleaning it, that th was another picture beneath, but as soon as he had recov the original painting, it was reclaimed by the nobleman sold it, and the Roman government forced Vallati to rest it; it is perhaps even more beautiful than the picture Dresden, and is now valued at 5000*l*. sterling: the b ground differs slightly from that of the Dresden pict Cristofano was an excellent landscape-painter. His mas pieces are considered the Miracle of San Giuliano, in Pitti gallery; San Manetto, in the church de' Servi; Ju and Holophernes; and a Magdalen, which was the port of his own mistress, a very beautiful woman. The Ju is also her portrait, and the Holophernes was painted f himself: it was engraved by Gondolfi for the 'Musée poléon.' He died in 1621: his portrait is likewise in Florentine portrait gallery.

(Baldinucci, *Notizie de' Professori del Disegno*, &c.; La *Storia Pittorica*, &c.)

ALLOTMENT SYSTEM may be defined to be the tivation of small portions of land by agricultural labou and other classes of workmen at their leisure, and after have performed their ordinary day's work. It is desir that every country labourer should have a garden attache his cottage for the growth of vegetables. In villages w the houses are not detached this cannot always be done, the most convenient mode of giving them gardens is to di a field near the village into small allotments. There are instances of this plan having been resorted to about the of last century, and the bishop of Bath and Wells comme the letting of allotments in 1807; but it is only since that its adoption has become common. In 1830 the agri tural districts in the south of England were almost in a of insurrection. The labourers went about in bands dest ing thrashing-machines, and demanding higher wages; at night the country was lighted up by incendiary

e impulse of fear the farmers increased the wages
ourers, but on the suppression of the disturbances
erally returned to the old rates. The season of
not however pass away without some attempts
le to improve the condition of the agricultural la-
d the extension of the allotment system was the
al mode by which an attempt was made to accom-
object. A society, called the Labourers' Friend
s established in London, to promote the allotment
to circulate information respecting it. Allotments
ments, or field-gardens, as they are sometimes
now common in all the agricultural counties in
it they are nowhere universal. In East Somerset
e found in about 50 parishes; and the quantity
oted to allotments is said to be equal to the de-
Farnley Tyas, Yorkshire, the tenantry of the
tmouth have agreed to allot a rood of land to the
each labourer employed on their farms, the rent to
at the average rent of the farm, with the addition
d taxes.

al of the northern and midland counties the allot-
em is promoted, and in some degree superintended,
ty called the Northern and Midland Counties Arti-
ourers' Friend Society. The number of acres under
, according to the report of this society, in June,
s 1082. There are several similar societies in the
ring districts; and the plans of some of them do
differ from the social schemes of Mr. Owen. The
n Land Allotment and Provident Fund Society, in
, 1844, purchased forty-two acres of freehold land,
it is intended to erect 160 five-roomed cottages,
ember of the society will be invested by the trus-
he freehold of his cottage and garden, at the cost
industrial school is to be erected in the centre
nents. At Rotherham a Land Allotment Society
ablished for the purpose of purchasing one rood
each of its members by payments of seven pence
he society has already obtained possession of four
res, which, in the last week of December, 1844,
into fourteen allotments and balloted for. The
and was 318*l.* In the case of these two societies
s to become proprietors of land. It is scarcely
remark that the members of these societies are
ral labourers. Allotments are also found in the
od of several large towns, and the proprie-
ries have in many instances granted allotments
men: but in both these cases the land is more
ltivated rather as a recreation than with a view
o the means of subsistence. It has happened
t in periods of manufacturing distress workmen
factories have been enabled to keep out of the
ith the aid of an allotment. At Nottingham land
the corporation is divided into about 400 gardens,
t at the rate of 1½*d.* a yard, or 25*l.* per acre:
umber of these gardens have been cultivated for
rs. Where the tenant is an agricultural labourer,
ct is to increase his resources, and thus enable
tain himself without assistance from the poor's
seems to be good authority for stating that the
tem has been successful in this object; and that it
diminished the incentives to crime, but has en-
its of sobriety and industry, and led to a general
of character. Of 3000 heads of families holding
land in West Kent, not one was committed for
ring the years 1841 and 1842. In the parish
Kent, there were 35 commitments in 1835, and
nt system being introduced in 1836 the com-
e reduced in 1837 to one, and from 1837 to
d been only one. About 15 of those who were
1835 became holders of allotments, and up to
o cause of complaint had arisen against any of
ence of Mr. Martin: *Report on Allotments of*
143 tenants of allotments under Mrs. Davies
ssex, there was only one person convicted in
13 years. (*Communication from Mrs. Davies*
, 1844.) Mr. Wilmot, agent to the duke of
o has laid out nearly 2000 garden allotments
shire, says, 'Numbers who, before they had
habitual drunkards, and reckless of every right
y degrees come round to a more steady course,
d their money in buying seed, manure, &c.,
orting to the beer shop.' The tenants of these
consist of agricultural labourers, colliers, and
S., No. 12.
mechanics. Similar testimony might be collected from various parts of the country where the allotment system prevails. The punctuality with which the rents are paid by the tenants proves how highly the labourers value their patches of land. Among Mrs. Davies Gilbert's numerous tenantry only three have failed to pay their rent in the course of 14 years; but in each case the size of the allotment (five acres) must be considered as taking it out of what may fairly be considered the allotment system. Captain Scobell, who was one of the earliest, and is now one of the most extensive, promoters of the system, estimates the loss from non-payment of rent as one-fourth, and certainly not more than one-half, per cent.

The great obstacle to the progress of the allotment system is the difficulty of obtaining land; but the landowners are much more favourable to it than the farmers, whose objections are—that the time which the allotment requires interferes with the labourer's ordinary employment; that it makes them too independent, and less anxious to obtain work; and, thirdly, they object that it affords a cloak for theft. These objections have frequently been entirely given up after the farmers have become practically acquainted with the operation of the system.

The principal rules which experience has shown to be best calculated to render the allotment system successful are the following:—As it is not intended that the tenant should look upon his plot of ground as a substitute for wages, but merely as a small addition to this main resource, its size should not be greater than can be cultivated during the leisure or spare time of the labourer or his family. The size of the allotment is determined by the number of the tenant's family, or the quality of the land, and in some cases by the quantity of manure which can be collected. The maximum size of allotments, according to Captain Scobell, should not exceed 50 or 60 rods, and 20 rods are sufficient for a person just settled and without a family. The size of Mrs. Davies Gilbert's allotments are as follows:—255 less than a quarter of an acre; 108 quarter-acres; two contain 60 rods each; 13 are half-acres; two are three-quarter acres; 22 are one-acres; 16 others contain two, four, and five acres; and one is of nine acres. Some persons state that a man in full employ can manage an allotment of a quarter of an acre, or 40 rods; but others are of opinion that 20 rods are quite enough. Lord Willoughby D'Eresby, in a letter which he published in November, 1844, proposes that every man of good character on an estate should have a quarter of an acre of garden-ground along with his cottage, which should be let to him by the landowner, and not by the farmer. To one-half of the whole number he would let additional allotments of three acres of pasture-land, or so much as would enable the cottager to keep a cow and three or four sheep; and further to carry out his views he would have farms on the estate of about 40 acres each, as an encouragement to the labourer to aspire to advancement in life. The diversity of views which are entertained as to the size of allotments may be explained by the fact that in one district the labourer may not be fully employed by the farmer, while in another, under a better system of farming, he may be employed at piece-work to the full extent of his powers. The allotment should be situated as near as possible to the tenant's cottage. Captain Scobell says that the distance should never exceed a mile, as the labourer will be fatigued by a longer walk, and it will be inconvenient to send so far for vegetables for daily use; and in fact this distance is far too great. In Kent there are allotments which are two or three miles from the labourer's dwelling, but this is a proof that employment is precarious, and that on the whole his condition is not good.

A much higher rent can be obtained for small allotments under garden tillage, than for land in undivided tenancy; and it is but reasonable that the owner of 100 acres divided into half-acre allotments, and having 200 tenants instead of one, should receive additional rent in respect of his additional trouble in collecting the rent, looking after his property, and other expenses that are incident to the division of the land. Those who are conversant with the system say that if the rent is one-third higher, the difference is not unreasonable; but as allotments are at present granted as a matter of favour, they are not always set at a rack-rent. Many persons recommend the landowner to take the cottages on each farm into his own hands, instead of allowing the farmer to let them. It is usual for the landlord to include tithes, parochial and other rates, in the rent, in order to save trouble, and to prevent the tenant being unexpectedly and frequently called upon for money payments. The rent of 137 acres belonging to Mrs. Davies Gilbert, divided into 419 allotments, is 428*l.* 8*s.* 5½*d.*, or nearly three guineas per acre, which includes rates, tithes, and taxes, but is exclusive of houses and buildings, which are paid for separately. The rents vary from 6*s.* up to 8*l.* an acre. The rent of 15 acres of land belonging to Mrs. Walker Ferrand, near Bingley, which are divided into 59 allotments, is 32*l.* 9*s.*, or 11*s.* for each allotment, averaging as nearly as possible a quarter of an acre each. With the addition of rates and taxes, the cost of the 15 acres amounted to about 40*l.* per annum. The value of the crops for 1844 was estimated at between 400*l.* and 500*l.*, or between 7*l.* and 8*l.* each. The tenants are chiefly employed in the worsted factories. A form of agreement, which is usually signed by allotment tenants, embodies rules for the management of the land, and fixes other conditions for their observance. Spade-culture is insisted upon, and the use of the plough is prohibited; also underletting and working on Sunday. There are instances in which attendance at the parish church is enforced; and in other cases it is merely stipulated that there shall be attendance at some place of worship. The allotment is usually forfeited for non-payment of rent, gross misconduct, commitment for any crime, or wilful neglect of the land. Cottagers without families, those whose circumstances are considered tolerably comfortable, and those whose character is not good, are in some instances not allowed to have allotments. A particular rotation of crops is sometimes required in the agreement. The growth of wheat is not allowed in some cases. Where it is encouraged, it may probably be safely assumed that in that particular district the labourer is worse off than usual. Some recommend that on a half-acre one half should be in wheat and the other half in potatoes; and it is assumed that other vegetables are grown in the garden attached to the labourer's cottage. Captain Scobell thinks it unadvisable to exclude any one from holding an allotment on account of previous bad character, as there is a chance of his being reclaimed. Becoming permanently a pauper is a fit ground for exclusion; but when the tenant receives casual relief on account of sickness or accident, he is not excluded. So long as the tenant observes the conditions of his agreement, it is found useful to stipulate that he shall on no other account be ejected from his land.

There seems to be no doubt that the absolute produce of the soil when cultivated in small allotments is greater than the same land would produce under the ordinary course of tillage by farmers. A much larger quantity of manure is used; in some cases four times as much as farmers are enabled to put upon their land, and a single rod is frequently made to produce vegetables sufficient for the consumption of a labourer's family for six months; but if every labourer had an allotment, the quantity of manure collected could not be so great as it is at present. The disposable produce per acre of land in large farms is of course much greater than when the same quantity of land is divided into small holdings.

Captain Scobell estimates the average value of an allotment at 2*s.* per week, or about 5*l.* per year, and that during the year 20 days' labour is required. The profit is equal to 10 weeks' labour at wages of 10*s.* per week. According to another estimate, the gross profit of half an acre is calculated at 19*l.* The produce consists of 12 bushels of wheat at 7*s.*, and six hundredweight of bacon at 6*d.* per lb.; and something is set down as the value of the straw. The rent, seed, and other expenses, it is said, will amount to 3*l.* 10*s.*, leaving a profit (without deducting the cost of labour) of 15*l.* 10*s.*, which is equal to 6*s.* a week for a whole year. Such an allotment as the one here alluded to will require about 30 days' labour in the course of a year; but it is necessary that the chief part of this labour should be given between Ladyday and Michaelmas. One of Mr. Sutton's allotment tenants at Wiggington, near Tring, stated at the Michaelmas rent-day, 1844, that the value of the produce which he had raised on his quarter of an acre was between 5*l.* and 6*l.* Supposing that there are a million families in England and Wales who are in the same circumstances as the tenants of existing allotments, and that four families had an acre amongst them, the whole quantity of land in allotments would be 250,000 acres, or nearly 400 square miles, which is one-third more than the area of Middlesex, and about the 128th part of the area of England. This would be about one 43rd of all the arable land in England. At three guineas an acre the rent would amount to 787,500*l.*, and the value of the produce, according to Captain Scobell, would be about 5,000,000*l.*

From the Anglo-Saxon period to the reign of Henry VII., nearly the entire population of England derived th
sistence, immediately from the land. The great la
consumed the produce of his demesne, which was c
partly by prædial slaves and by the labour of the ten
cottiers attached to the manor. These tenants
occupiers of small farms, and paid their rent in ki
services, or in both. The cottagers had each a sm
or parcel of land attached to his dwelling, and the
turning out a cow or pigs, or a few sheep, into th
commons, and wastes of the manor. While work
the lord's demesne, they generally received th
[Villein and Villenage, P. C.] The occupation o
on a farm of 160 acres, called Holt, in the parish of
Sussex, has been traced at various dates between
1200 and 1400. During the thirteenth and
centuries, this farm, which is now occupied by on
was a hamlet, and there is a document in existen
contains 21 distinct conveyances of land in fee, des
be parcels of this hamlet. In 1400 the number of p
began to decrease; by the year 1520 it had been
to six; in the reign of James I. the six were reduc
and soon after the restoration of Charles II. th
became the property of one owner, who let it as
one occupier. (*Quarterly Review*, No. 81, p. 250
history of the parish of Hawsted in Suffolk, by
Cullum, shows a similar state of things with regar
occupancy of land. In the reign of Edward I.
1307) two-thirds of the land in the parish, which
1980 acres, were held by seven persons, and the re
third, or 660 acres, was held by 26 persons, which
give rather more than 25 acres to each holder. The
of tenants who did suit and service in the manorial
a somewhat later period was 32; and one tenant
occupier of only three acres. In the reign of Ed
there were 50 messuages in the parish; in 1784 th
52; in 1831 there were 62, inhabited by 88 famili
in 1841 there were 100 inhabited houses, the inc
population being from 414 in 1831 to 476 in 1841.
there were nine occupiers of land who employed la
and two who did not hire labour.

The consolidation of small farms in the sixteenth
and the altered social state of the country which to
at that period from a variety of causes, dissevered to
extent the labouring classes from the soil which th
vated. They had previously produced for their o
sumption, and as domestic manufactures were comm
household possessed within itself the means of satis
principal wants. They now began more generally
for money wages; and in vain did the legislature att
preserve them from dependence on this source of sub
by enacting penalties against building any cottage
laying four acres of land thereto.' (31 Eliz. c. 7.)
were still, however, large tracts of waste and comm
on which the cottager could turn a cow, a pig, a fe
or geese, and this right still gave him a portion of su
directly from the land. The division and inclosure
commons and wastes completed the process by wh
labourer was thrown for his sole dependence on mone
From the reign of George I. to the close of the
George III., about four thousand inclosure bills were
Under these allotments were made, not to the occup
the owner of a cottage, and this compensation
extinguished common right generally benefited only th
landholder; and when this was not the case, the
was tempted by a high price offered by his richer neig
or driven by the abuses of the old poor-law, to part w
patch of land.

So long as the labourer is paid fair wages, he ca
the chief necessaries of life; yet it happens that
parts of the country he would be unable to proc
other description of vegetables, except potatoes, un
had a garden attached to his cottage. No agri
labourer's cottage should be without a garden whe
practicable. The cottager's garden should be large
to enable him to grow sufficient vegetables of all ki
his own consumption; though if potatoes for winter
can be purchased from his employer, or grown un
usual conditions on a patch of his employer's land, it
as profitable as growing them himself, that is, if he i
employment and obtains piece-work at good wage
necessity for cultivating the land on his own account,
than for the purpose of raising sufficient vegetables
own consumption, and of looking to the allotment sy

of remedying the evil of low wages and insufficient
ment, is, in proportion to its urgency, an indication of
position of the agricultural labourer. If he has sunk
erior state, and there are no other means of increasing
rces, the allotment system is then an expedient
of attention, and at the present time great expecta-
entertained of what it is capable of doing for the
but it should be understood that, in an economical
is a more satisfactory state of things when the
nt in the condition of the labourer arises from the
of the farmer and his ability to give higher wages.
of the farmer and the wages of the labourer are
the same source, and if the latter are reduced
w point profits are usually low also. When im-
in the condition of the labourer springs from the
ystem, and not from the wages which he receives,
ally be assumed either that the resources of the
impaired, or that the labourers are so numerous
nnot all obtain as much work as they are capable
ing. But if the allotment system be regarded as
f improving the condition of the labouring class, its
must necessarily be partial, since it cannot be ren-
plicable to the non-agricultural labourers in the large
nd as to the agricultural labourers there is nothing in
dition to prevent any pecuniary benefit from allot-
eing followed by a decline in their wages.

question of the advantages of the allotment system
reduced within narrow limits. If it be understood
ense of the definition given of it at the head of this
the object is rather moral than economical. The
nt system may also be intended, not to change the
into an independent cultivator, but to supply him
eans of making a living in those places where his
wages are not sufficient. But, as already observed,
ies and admits that his condition is not so good as
to be for his own and the general benefit. There
abundance of agricultural labour, or a want of suf-
pital invested in agriculture, in the place of the
residence, or both causes combine to depress his
. Now it is possible that the allotment system, if
any great extent, might contribute to increase the
dance of labour, by inviting to a district more
than are wanted, or by giving them an inducement to
soon, and so ultimately to depress the condition of
rer still further. It is no answer to this, that plots
d have been and are cultivated by the labourer
ly to himself and profitably to the owner. It
mitted that circumstances in any given place may
that the distribution of allotments among labourers
not fully employed, may be of great temporary
to themselves and to the neighbourhood. But a
extension of such allotments in the same neigh-
though it might be called for by the wants
bourers, would be no benefit to that neighbour-
ultimately to the labourers themselves; for the
d be that many of them would be reduced
r entire means of subsistence out of a small plot
d. The allotment system then, if carried to
, involves the question of the advantage of very
s as compared with large ones; a question that
discussed satisfactorily without a consideration of
l economic condition of each particular country.
be laid down as a sure principle that in a country
ge part of the population are employed in other
n those of agriculture, the necessary supply of
her agricultural produce, for those who are not
s, cannot be raised so profitably in any way as by
structed farmer, who has a sufficient capital to
arge farm; and if the whole country were divided
farms, the necessary supply of produce for the
non-agriculturists would ultimately fail altogether,
small-farm system were gradually extended in
o the demand, the result would be that each man
course of this distribution, have just as much as
produce enough for himself and his family; and
e must be content with less than is sufficient, and
reduced to the condition of the Irishman who
small plot of land.

a difference between small farms of a few acres
let on lease, and small farms which are a man's
If all farms were divided into small holdings,
be little accumulation and little improvement.
same disadvantage in small farms compared with
great, that there is in small manufacturing establishments compared with large ones. Profitable production is carried on better on a large farm when proper capital is employed (and indeed a large farm without proper capital would ruin any man), than if it were divided into a number of small farms and the same amount of capital were employed; for it is obvious that the amount of fixed capital in buildings, agricultural instruments, and animals must be greater on the small farms than on the large one. There are many other considerations also which show that, as a matter of public economy, the large farms are best for the public, and consequently for the holders of such farms. The small farms, if stocked sufficiently, would pay the farmer, not equally well with large farms, but still they might pay him sufficiently well to make his investment profitable. But such farms are generally understocked. In fact it is only in those cases where the cultivation is with the spade, and the land is managed like a garden, that such small holdings can be made profitable: the holder cannot, as a general rule, enter into competition with the large producer as a supplier of the market.

In some countries, where there are numerous small landholders, and it is usual for the estate to be divided on the death of the head of the family, the tendency must be, and is, to carry this division further than is profitable either to the community or to individuals. But in such case the evil may correct itself: a man can sell what it is not profitable to keep, and turn his hand to something else. The man who has been long attached to a small plot as a tenant, and mainly or entirely depends on it for his subsistence, will not leave it till he is turned out.

The allotment system, when limited to the giving a labourer a small plot of garden-ground, presents many advantages. But the object of making such allotments is moral rather than economic: the cultivation of a few vegetables and flowers is a pleasing occupation, and has a tendency to keep a man at home and from the alehouse. In many cases also, a small plot of ground can be cultivated by the labour of the wife and the young children, and a pig may be kept on the produce of the garden. The agricultural labour of young children is of very little value, but children may often be employed on a small plot of ground. Such employment is better than allowing the children to do nothing at all and to run about the lanes; and if their labour is well directed to a small garden, it cannot fail to be productive, and to add greatly to the supply of vegetables for the family.

Any extension of the allotment system beyond what a labourer can cultivate easily at his leisure hours, or with the assistance of his family, may be for a time a specious benefit, but in the end will be an injury to himself and to others. If a man is a labourer for hire, that is his vocation, and he cannot be anything else. If he becomes half labourer and half cultivator, he runs a risk of failing in both capacities; and if he becomes a cultivator on a small scale, and with insufficient capital, he must enter into competition in the market with those who can produce cheaper than himself; or he must confine himself to a bare subsistence from his ground, with little or nothing to give in exchange for those things which he wants and cannot produce himself.

The legislature has in several instances sanctioned the plan of allotting land to the poor for cultivation, in some cases for the paupers of the parish only, and in others for the independent cottager. The 22 Geo. III. c. 83, § 27, provides for the inclosure of land adjoining workhouses, not exceeding ten acres in extent, in order that the same may be cultivated and improved by the poor, that is, it may be inferred, by the paupers. Under 59 Geo. III. c. 12, parochial authorities were empowered to provide land not exceeding twenty acres in extent, on which the poor might be employed. The act 1 & 2 Wm. IV. c. 59, enabled churchwardens and overseers, with the consent of the Treasury, to enclose fifty acres from any forest or waste lands belonging to the crown. Another act was passed in the same session (1 & 2 Wm. IV. c. 42) to inclose fifty acres of waste land, and to cultivate and improve the same for the use and benefit of the parish, or to let any part of it to any poor or industrious inhabitant of the parish to be cultivated on his own account. The most important act on the subject of providing land for the poor is the 2 & 3 Wm. IV. c. 42, passed in 1832. It authorises (in parishes enclosed under any Act of Parliament) the letting of the land set apart by the Inclosure Act, generally with a view to provide fuel for the poor; and the rents are to be applied to the purchase of fuel. The preamble of the act alludes to the advantage of letting such land 'at a fair rent, and in small portions, to industrious cottagers of good character.' The act is to be carried into effect by the trustees appointed by the Act of Inclosure, and by the parish officers in vestry assembled. The allotments are to be not less than one-fourth of an acre, and they are not to exceed an acre, and the rent is to be the average rent of land of similar quality in the neighbourhood. It must be let to industrious cottagers of good character, being day-labourers or journeymen settled in the parish. The tenants must cultivate their allotments in such a manner as to preserve it in a due state of fertility; and non-payment of rent or improper cultivation subjects them to be ejected. In case the land which the vestry is authorised to let be inconveniently situated, it may be let, and other land for the cottagers may be hired. No habitation is allowed to be erected by the tenants. The provisions of this act are extended to the acts 1 & 2 Wm. IV. c. 42 and c. 49, already noticed. The 5 & 6 Wm. IV. c. 69, § 4, places the working of the various acts quoted above under the control of the Poor Law Commissioners. In the session of 1844 a bill for the promoting the letting of allotments to the labouring poor was introduced into the House of Commons, which contained regulations and provisions for superintendence of a very complicated nature. When a cottager has a garden attached to his dwelling, he may manage it as he pleases, and it may or may not be well cultivated, but his independence is not interfered with, and he is not placed in a state of tutelage under parish authorities. The bill in question, which is likely again to be brought forward, proposed to delegate the powers conferred upon parish officers by the acts already quoted to four 'wardens of field-gardens,' who are to be elected triennially by the parishioners in public meeting assembled, and who are to act in conjunction with the officiating minister of the parish. The wardens are to be authorised to take land belonging to the parish or to hire land to an extent not exceeding half an acre for every rate-payer assessed at not more than 10*l*. This land they are to let in field-gardens or small plots.

ALLSTON, WASHINGTON, a distinguished American historical and landscape painter, was born in South Carolina, in 1779, and was educated at Harvard College, which he entered in 1796, having spent a preparatory term, by the advice of his physicians, at Newport, Rhode Island. Having determined to follow painting as a profession, he resolved to visit England for that purpose; he accordingly set out in 1801 with another artist, for London, and entered the Royal Academy of Arts of London as a student, in which he remained three years, during the presidency of West.

In 1804 he went with a friend to Paris, and thence to Rome, where he remained four years. In 1805 he attracted considerable notice there by a picture of Jacob's Vision. He excelled chiefly in colouring, and is said to have created considerable sensation among the painters in Rome, by the peculiar effects which he accomplished, through a great use of asphaltum, after the manner of Rembrandt. Many of the German and Italian painters endeavoured to imitate his effects; they however failed, says the 'Morgenblatt' (1807), and spoilt several of their pictures.

He painted several pictures at Rome, which were admired for their colour and chiaroscuro; among them a portrait of himself, and several landscapes.

In 1809 Allston returned to America, and at Boston married the sister of Dr. Channing. In 1811 he again visited England, where he obtained the 200 guineas prize from the British Institution for a picture of 'The Dead Man raised by Elisha's Bones,' which was afterwards bought by the Pennsylvanian Academy of the Arts for 3500 dollars. In 1813 he had the misfortune to lose his wife, at a time when he was himself in a very weak state of health. In 1814 he published a book entitled 'Hints to Young Practitioners in the Study of Landscape Painting.' In 1817 he paid a second visit to Paris, with Leslie the Academician; and he returned in the following year to America, to Cambridge in Massachusetts, where he resided until his death in July, 1843. He was an Associate of the Royal Academy of London; his election took place in 1819. In 1830 he married a second wife, who survives him. Fiorillo, in his history of painting in England, speaks of a clever picture by Allston, of a French soldier recounting his deeds of heroism to a circle of listeners around him. Two pictures of Jeremiah and Uriel are noticed in Dr. Nagler's Dictionary of Artists, as having been painted by Allston in 1821. Shortly after his death a large unfinished picture of Balshazzar's feast by him was exhibited
at Boston. He has left several other unfinished w
is spoken of as having been a very accomplished
elegant writer.

(*Art Union*, 1843; Fiorillo, *Geschichte der*
vol. v.)

ALOES—*Medical Properties of.* Though kn
antients and largely used in modern times, the sour
drug are not accurately determined. It seems bett
the plan of the 'Edinburgh Pharmacopœia,' and a
an undetermined species of the genus Aloe, rathe
strict it, as done by the 'London Pharmacopœia,'
spicata, which, though it may yield Socotorine and
aloes, is not the source of Barbadoes aloes, which
appear to be procured from the A. vulgaris, a plan
Greece, and which furnished the aloes of the an
which is now cultivated in the West Indies, as we
Italy, and Sicily, from which latter countries Franc
continental nations, but not Britain, are often supp
plan seems the more judicious, as the commerci
however designated, or whencesoever derived, are
of nearly every degree of excellence or worthless
be not taken in the mode of obtaining the ar
O'Shaughnesy, whose position in the East gives
opportunities of observing, states, in his 'Bengal Dis
that 'the quality of the product is apparently more
on soil, climate, and preparation than on specific
in the plant.' Not only has Barbadoes aloes becom
luable from changes in the mode of collection; but
real Socotorine aloes has become deteriorated, from
in the island of Socotra being at liberty to cut as m
of the now neglected plant as he pleases, and pre
any way he likes, instead of the care formerly be
it. 'Formerly every part of the island produced
and the whole was farmed out to different indivi
produce being monopolised at a fixed price by th
The boundaries however thus set up, which consist
stone walls, and were carried with immense labour ov
dale, though they still remain, under the present
government no longer distinguish property. The d
of the owners to whom the several fields were
allotted, have either withdrawn their claims or
forgotten. At present, any one collects the a
who chooses to take the trouble, and nothing is lev
count of the Sultan.' (Lieut. Wellsted, 'Memo
Island of Socotra,' in *Journal of Royal Geogr. Soci*
p. 197.) In the language of the island the aloe
Tayef; by the Arabs, Soobah. Though this islan
plants sufficient to yield nearly all the aloes require
merce, very little is now obtained from it; and w
under the name of Socotorine aloes is almost entirel
East Indian sort, as is rendered further evident by
exported from Bombay. When one source of any
commerce is dried up, it is the custom of the deal
stow the name of the sort in greatest repute on the
possess; meaning, not that it is the produce of the
name of which it bears, but that it possesses the q
the kind originally obtained from that part. Alte
commerce, dependent on a variety of causes, are
rendering implicit reliance on names a very unsafe g

Attention to the mode of extracting the juice mig
aloes, whencesoever procured, of excellent quality;
be seen presently how little the ordinary methods
lated to ensure this end, quantity rather than qual
aimed at by the preparers. The aloe, like the hya
many other liliaceous plants, contains a vast quantity
laginous matter (vegetable albumen?), more abunda
the centre of the thick fleshy leaves than near th
The medicinal juice is altogether different from thi
contained in a distinct set of vessels (Opangia, Lin
phora, vasa laticifera), which are distributed chie
the thick cuticle of the leaves. Out of these vessels
sometimes exudes, either from turgescence or from
tures of insects, and concretes into tears, forming th
of aloes called Aloe lucida, seen occasionally as a
but not met with as a commercial article. (The te
cida is applied by Geiger and Theod. Martius to f
aloes, but it is quite distinct from that now spoken
transverse but not deep incisions were made at vario
and at proper distances in the course of the leaves
attached to the stem, much fine aloes could be pro
scraping off the juice from time to time as it flows, or
it to become concrete and then picking it off. Th
practice however is to cut off the leaves near the bas

pen ends into a skin, into which the juice flows. This wards inspissated, either by spontaneous evaporation in n, or promoted by a gentle heat. Pressure of the is sometimes made to assist the flow, but by this means quantities of viscid mucilage are forced out, and mix he proper bitter juice, which is proportionately deterio- (O'Shaughnesy.) Dipping the leaves into hot water, ch their vitality is lessened or destroyed, and their opicity diminished, is equally objectionable, as the mucilage then flows out more freely. Worst of all is now, but not formerly, pursued in Barbadoes. Barbadoes of the present day is the extract of a decoction. de by immersing for ten minutes in boiling water the leaves previously enclosed in cloths or wicker baskets, g the strength of the decoction with repeated supchopped leaves till the water is fully charged; then the liquor to cool and the sediment to settle; and vaporating the clear liquor with caution till it is consufficiently to become solid on cooling. The hot allowed to concrete in large gourd-shells, in which it transported to Europe.' (Christison.) From these plans of collecting and inspissating the juice, results e which differs considerably in appearance and greatly

Aloes is one of the few drugs in which adulteration extensively practised further than by substituting the and low-priced kinds for the superior. When careprepared, sand and fragments of leaves and skins are ly found in the samples.

r of the most important sorts found in commerce may ed. The finest sort, to which the term Socotorine given, can scarcely be regarded as one of daily occurd is noticed merely as a standard of excellence by judge of others according to the degrees in which oximate it. 'It consists of small angular fragments, ; a deep garnet-red colour, altered somewhat by exthe air; a conchoidal fracture, a resinous lustre, slucency in thin layers, a beautiful garnet-red hue itted light, and a peculiarly fragrant odour. It is sily pulverisable, and of a fine golden-yellow tint powder. It is almost entirely soluble in spirit of r of 950°, a very scanty light flocculent matter being hristison.) As specimens decline from this ungh standard, the lustre diminishes, the fracture is he odour less pleasant, the solubility less, they are dily pulverisable, the powder is of a deeper colour, to brown, the residuum greater, and consisting of he flocculent matter, as well as incidental impurities. I to the amount of insoluble matter, Barbadoes aloes he most, varying from 5 to 12 per cent.; and it is e difficult to reduce to powder, as the mode of obexplains.

ief varieties go by the name of—Socotorine: East lled also frequently *hepatic*; and Cape aloes (*Aloe* Geiger and Theod. Martius), also called *A. Cabo*. le subvarieties of these are found. Caballine, or . has nearly disappeared from commerce, refinement in veterinary medicine deeming it not fit for

s aloes comes to this country in the gourds and nto which it is poured when prepared. Each of hs from sixty to even eighty pounds. When fracture is sometimes conchoidal, seldom lustrous, a more liver-like aspect, better entitling it to the of *hepatic*, by which it is frequently called, than thers.

recent chemical analyses of aloes have been made al chemists, and although they designate the spesed, it cannot be accurately known how far they ith the kinds so called in Britain. The chief however are *aloesin* (or saponaceous principle), times to the amount of 81 per cent.; *resin*, varyto 50 per cent.; *vegetable albumen*, absent from ls, present in others from 5 to 12 per cent.; trace according to Traunsdorff; *aloetic acid*, acreira. Aloes is however of rather a more comhan appears from this view. Aloesin, or aloerely soluble in cold water, but not in absolute ien hot water is used, something is taken up, osited as the water cools: to this the name of n given, perhaps not with perfect propriety. s looked upon as the cathartic principle of aloes, er as an irritant and objectionable ingredient. e of the 'Pharmacopœias' an extract is ordered to accomplish their separation, a proceeding altogether unnecessary, when aloes of the best quality can be obtained by giving a proper price for it. The formation of a decoction by heat is still more objectionable, as a much superior preparation is made by cold water alone, more grateful to the stomach, and not less effective if given in rather larger dose.

Few more valuable drugs exist, as is proved by the numerous preparations made either of aloes alone, or with some other articles combined with it. These combinations have various objects in view, some to heighten its powers, others to modify, and some to get rid of certain well-founded objections to its effects. The chief of these are noticed here.

In large doses it is decidedly aperient, but is unlike many other cathartics in so far that increasing the dose beyond a certain point by no means increases the effect. This can be accomplished however by associating it with other cathartics, and still more decidedly by uniting it with tonics, such as iron or quinia. Aloes and quinia with antimonial powder, and aromatic powder to cover the unpleasant taste, form a combination of great utility in many gastric derangements, especially where the head is implicated. Thus, when persons are so fortunate as to be rallying from the stage of collapse in Asiatic cholera, this combination given frequently improves the secretions and abates the fever. In some fevers with numerous liquid motions it may also be given with striking benefit, the motions diminishing in frequency and increasing in solidity, as well as becoming of a more healthy appearance. In the congested state of the bowels and brain which precedes water in the brain, aloes, either in this combination or in some other form, is of great utility. (Yeats *On Water on the Brain.*) Persons predisposed to apoplexy are more benefited by aloes than by most other purgatives, especially if they have been previously subject to a hæmorrhoidal flux which has been suppressed.

The combination which increases the purgative power of aloes in the most remarkable degree is formed by adding one drop of strong (undiluted) sulphuric acid to four grains of Barbadoes aloes, and forming a pill, two of which, given every two, four, or six hours, will almost invariably relieve the most obstinate cases of constipation, such as occur in painters' cholic, ileus, and other diseases. It is even more efficacious than croton-oil, and not so apt to excite inflammation of the intestines. This augmentation of power seems to be in conformity with a general law, by which many vegetable principles have their properties heightened by adding an acid, either mineral or vegetable. Thus ammoniacum becomes a more powerful expectorant by adding dilute nitric acid to the mistura ammoniaci; and the fœtid gums, such as asafoetida, are rendered more potent by solution in vinegar. ('Acetum Antihystericum,' formula No. 1, in Copland's 'Dictionary of Medicine.')

Aloes, especially the compound decoction, is a most valuable emmenagogue, particularly when combined with tincture of ergot or preparations of iron. From its action on the lower part of the bowels it is deemed an improper purgative in pregnancy or during the menstrual flux. It is also considered improper for persons subject to piles. This objection has been attempted to be obviated by various means, but the best way is to combine it with other agents, as stated by Dr. Christison, as many persons can take the compound gamboge-pill, or compound extract of colocynth, who cannot take aloes alone. The best means of covering the unpleasant taste of aloes when given in the liquid form is the compound tincture of lavender.

ALPACA, or PACO. The natural history of this animal is treated of under LLAMA, P. C., pp. 72, 73. The introduction of alpaca wool in manufactures has attracted considerable attention, and the question of naturalizing the alpaca in this country, in Germany, and in Australia, is also an object of much interest. The wool of the alpaca is superior to English wool in length, softness, and pliability. The fleece averages from 10 to 12 lbs., while that of our sheep is seldom more than 8 lbs.; and while the staple of English wool does not often exceed six inches in length, that of the alpaca varies from eight to twelve inches. The lustrous appearance of the alpaca wool renders it applicable to many of the purposes for which silk is usually employed in textile fabrics; and it is found a useful substitute for Angora wool. The manufacture of plain and figured stuffs from the fleece of the alpaca was commenced at Bradford, in Yorkshire, a number of years ago, and these fabrics have been much admired. The consumption of alpaca wool in this country in the seven years ending December, 1843, is estimated by Mr. Walton at 12,000,000 lbs. A Parliamentary paper (197, Sess. 1844) gives the import of wool of the llama and alpaca tribe for the year 1843 at 1,458,032 lbs.„and the consumption was probably higher in that year than it has ever yet been. The price is from 2*s*. to 2*s*. 6*d*. per lb. Towards the close of 1844 five different articles were manufactured at Bradford for her Majesty, from the wool of an alpaca which had been kept at Windsor. The fleece weighed 16½ lbs., and when sorted and combed 10 lbs., including 1 lb. of white wool, the remainder being almost entirely jet black. One of the articles manufactured was an apron, in which the wool of the alpaca, without the admixture of any other wool, was used for the first time in this country; for though very large quantities have been woven at Bradford, it has usually been in fabrics where the warp was of cotton or some other material, and the weft only of alpaca. Amongst the other articles manufactured for her Majesty were a striped and figured dress; the warp consisting of rose-coloured silk, and the weft of black alpaca with figures on alternate grounds of alpaca and silk. This dress, which measured 12 yards, required 2½ lbs. of alpaca. A plaid dress, measuring fifteen yards, and containing 2½ lbs. of alpaca, was woven with an intermixture of silk and worsted. Another article was a plain black alpaca lustre dress, the warp of fine cotton twist, and the weft of alpaca. This required 3½ lbs. of alpaca, and when taken from the loom it resembled silk from its lustrous quality, and was of course much softer.

Besides the use of the wool in textile fabrics, the flesh of the alpaca is also wholesome and palatable. The carcass weighs on an average about 180 lbs.

The question of naturalizing the alpaca has been taken up with great enthusiasm by a few persons; but very little progress has yet been made in convincing the country of its practicability. The alpaca inhabits the mountainous and inhospitable regions of Peru, and is remarkable for its abstemiousness. It thrives on coarse food. Those which have been brought to this country have been confined in parks and richly cultivated lands, and have been treated with too much care and tenderness. Mr. Walton asserts that they will live where our hardiest sheep would starve, and that the wildest parts of Great Britain are best suited to their habits. In the 'Transactions of the Highland and Agricultural Society,' 1844, there is an account, by Mr. Stirling, of the attempt which is now making to introduce the alpaca into Scotland. During the severe winter of 1843-4, when sheep required to be regularly fed with turnips and hay, the alpacas perseveringly sought their own food, and did not experience a single day's illness. Mr. Stirling says that they were kept within enclosures better than sheep, and never attempted to leap a fence. In 1841 the Highland and Agricultural Society offered their gold medal for 'a satisfactory account, founded on actual observation and experiment, of the attempt to naturalize the alpaca in Scotland;' and in 1844 a prize was offered by the Society for the best pair of alpacas born and bred in Scotland, and the best two, male and female, imported. If, as Mr. Walton states, the alpaca may be pastured on lands which are now waste and unprofitable, and where the hardiest sheep would starve, the naturalization of the animal would undoubtedly prove a great 'national benefit;' but if this is not the case, it is a question whether a constant demand for the wool as an article of import would not be quite as beneficial. The Peruvians would be induced to bestow greater care on the management of their flocks, and the possession of so valuable an export would bring them under influences of a civilizing nature, which would render them better customers for our commodities. The expense of importing the alpaca is very great, and the long voyage kills more than two-thirds of the number shipped.

(Walton *On the Alpaca; its Naturalization in the British Isles considered as a National Benefit.*)

ALTDORFER, ALBRECHT, painter and engraver, and one of the most celebrated of the old German masters, was born at Altdorf in Bavaria, in 1488. This has been shown by Heineken, who acquired his information from a senator of Regensburg (Ratisbon), who found documents concerning the family of Altdorfer in that city. Those who speak of him as a Swiss have been misled by Sandrart, who was the originator of the error.

Altdorfer was himself a member of the interior senate of Regensburg, of which city he was enrolled a burgess in 1511; he was also architect of the city of Regensburg. He was probably the son of Ulrich Altdorfer, an artist of Regensburg, who gave up his right of burghership in 1491.

Altdorfer did not paint much, but his pictures show a surprising patience and industry. There is in the Pinakothek
at Munich a picture by him, representing Alexa
of Arbela, of which the labour is prodigious.
date 1529; it is not of large dimensions, but conta
innumerable mass of small figures, all in the Ger
costume of the day, every article of dress or mi
ment being made out with the greatest exactn
the various and probable incidents of a battle pr
duced. There is perhaps not another picture
which contains so many figures; the design is how
Gothic, and Altdorfer has wholly neglected the
of aërial perspective. This picture was formerly
heim, whence it was taken by the French to P
poleon was so much delighted with it, that he
be hung up in his bath-room at St. Cloud, where
until 1815. Though one of the most interesting
able productions of German painting, it has nev
graved; the very sight of it, however, would pr
many engravers. His other pictures are in a s
he scarcely ever painted large figures: the Saviou
and John, St. Peter, St. Catherine, and another
convent of Mölk, which are the size of life, a
known exceptions, and these have been attribut
Dürer, who is supposed by some to have been t
Altdorfer, but it is a mere conjecture.

There are several of Altdorfer's pictures at S
near Munich; some at Nürnberg and Regensbu
of Christ at Vienna, and a Susannah and the E
Pinakothek at Munich.

As a wood-engraver Altdorfer is more gene
and he is inferior to Albert Dürer alone, of the
or little masters; he is called by the French, Le
his cuts, amounting to about 80, are slight, and
ill drawn, but they are executed with great free
bein is said to have studied Altdorfer's cuts, w
a certain similarity of style, notwithstanding th
of Holbein, is not improbable.

His metal plates on copper and pewter are mo
than his woodcuts, and amount to about 112,
inferior to his cuts, and very inferior also to th
of Dürer and Aldegrever; they are extremely
sionally very badly drawn, and generally bad i
mities.

From the dates on his works he appears to
earlier life an engraver, and in about the year
given up engraving for painting. His prints ar
1500 to 1525, and on two of his principal pict
the dates 1526 and 1529: 1538, the reported
death, is found upon one picture. He lived chief
burg, and died without issue. Regensburg at
sessed many of Altdorfer's works, but they ha
moved to Munich; among them is nearly a compl
of his prints, which were presented to the tow
the Stadtgerichts-assessor Peuchel. The subject
fer's prints are historical, sacred and profane, and
with a few landscapes and some designs for gol
set of thirty-eight small cuts by Altdorfer, ill
Fall of Man and his Redemption, was published
a person whose initials were G. L. F., as the
Albert Dürer, according to the title; yet in th
publisher states that they are certainly by Altd
complete set contains forty cuts. Heineken,
Bartsch have given lists, more or less complete, o
prints.

(Sandrart, *Teutsche Academie*, &c.; Heineken,
des Artistes, &c.; Fiorillo, *Geschichte der*
Künste, &c.; Huber, *Manuel des Amateurs*, &
Peintre-Graveur.)

ALTERED STRATA. In addition to the
and division by cracks, joints, and fissures, to wh
have been subjected, in unequal degrees, there are
of uncommon induration, internal re-arrangement
and even the production of new mineral ingredi
happen in the strata near to rocks of igneous
along certain great fractures and flexures. He
appealed to for these effects, and justly; but in
mere pervading warmth, Von Buch supposes va
some ingredients (as magnesia, which converts
dolomite), and the solution of others in hot water
sary to explain the various contents of mineral

ALU'NNO, NICCOLO', one of the old Umbr
of the fifteeeth century, less known than he des
There are very few of his works extant, and V
him only in the Life of Pinturicchio, and treats

ary. Mariotti however, in his 'Lettere Pittoriche states that Alunno was established as a painter as early as 1460, and that he painted at least two re that date. He was a native of Foligno, and his signed 'Opus Nicolai Fulginatis,' or 'Nicolai Ful- pus;' but there was a Niccolo Deliberatore, likewise io, and therefore all the works with this signature e by Alunno.

ief works were in a chapel of the cathedral of f which there is now scarcely a trace left; Vasari f a Pietà as a part, with two angels bearing and weeping so naturally, that in his opinion no ould have done them much better. Besides which ations as capital works a Nativity, in the church of ustino, at Foligno; an altar-piece for San Francesco, ther for the high altar of the cathedral of Assisi. s still at Foligno, over a side altar of the church of colò, a picture of that saint and the infant Christ, as painted by Alunno in 1492: it had formerly a r a long picture in various compartments, which originally as a base, according to the old Italian ith altar-pieces: but being one of the paintings French thought fit to send to Paris, it was returned eral restoration of the plundered works of art, predella, which is now in the gallery of the contains six pictures, one of which is an alle-, of two angels holding a scroll, upon which are verses which are legible with difficulty, cele- bilities of Alunno, and the generosity of a lady of Bressida. The other five pictures are from Christ. They are drawn in a dry and meagre very brown in colouring, and have strong con- s: but they have much expression, and are facility. Alunno excelled in expression; he bit, in his large pictures, of painting the heads which gave them a truth and reality not found of many of his contemporaries. The period of ot known, but he painted after 1500; he painted nner in water-colours, or à tempera. Alunno me standards used in religious processions; they faloni. There is still extant a gonfalone of this r him made of very fine canvas, in the church ria Nuova, at Perugia, with the inscription—nnciata fecit fieri hoc opus, 1466.'

(*ite de' Pittori*, &c.; Lanzi, *Storia Pittorica*, r. *Italienische Forschungen*.)

Z, DON JOSE', a very distinguished Spanish ne of the most eminent artists of the nineteenth born at Priego, in the province of Cordova, in father was a stonemason, and Alvarez's youth a labourer in that business, as his father was too ort him otherwise. He however evinced an lpture at an early period, and employed what ld spare from his daily labour with a view to elf as a sculptor. In his twentieth year he ogress as to obtain admission into the academy of which he soon distinguished himself for his lelling. A lion destroying a serpent, which he ntain at Priego, obtained for him the patronage nio de Gongora, the Bishop of Cordova, the academy of that place, who took Alvarez into l caused him to be elected a member of the Notwithstanding his proficiency, however, in Cordova and entered as a student into the aca- Fernando at Madrid, of which as 'the Anda- n became the most distinguished student. He rst prize of the academy, for a basso-rilievo of of Ferdinand I. and his sons carrying bare- aculously discovered body of St. Isidore to the Juan de Leon.

e was granted a pension of 12,000 reals by enable him to prosecute his studies in Paris In Paris he paid great attention to anatomy, and public dissecting-rooms; and he gained there lemical honours: he obtained the second great ure awarded by the Institute. Alvarez was a rer of the sculptures of the Parthenon which fier had brought to Paris from Constantinople; drawings of them, and his improved taste was statue of Ganymede, which he made in 1804, he acquired the reputation of one of the first of tors. Napoleon, then emperor, paid two visits f Alvarez, and presented him with a gold medal of the value of 500 francs. Notwithstanding this personal honour, Napoleon's after-conduct regarding Spain excited in Alvarez an invincible aversion to him: he would never model his bust, and when Joseph Bonaparte was proclaimed king of Spain, Alvarez, then at Rome, was imprisoned in the castle of St. Angelo for refusing, as a pensioner of the Spanish government, to take the oath of allegiance to the new king; he was however released shortly afterwards. After the completion of his statue of Ganymede, Alvarez's pension was increased to 28,000 reals, and he left Paris for Rome, where he thenceforth chiefly resided. In Rome he executed or modelled many much admired works, the best of which was a group of Antilochus and Memnon in 1818, for which he was nominated court sculptor by Ferdinand VII., who commissioned him to execute the group in marble: it is now in Madrid.

In 1825 he was appointed principal sculptor to the King of Spain, and was decorated with the cross of Civil Merit. In 1826 he visited Madrid for the purpose of selecting the best statues and other sculptures in the king's palaces to be placed together in the museum of the Prado; but he died within twelve months of his arrival, in the sixtieth year of his age. From his office, the circumstances connected with his death, and the honourable commission about which he was engaged, it is evident that the reports which appeared in the French newspapers at the time of his death about his extreme poverty bordering upon destitution must be false. There are many of his works at Madrid, several from antient mythology; some full-length statues, and a few busts. Busts he did not willingly model, but the few he did are reputed excellent likenesses, and among them are those of Rossini, the composer, and Cean Bermudez, the author of the Dictionary of Spanish Artists.

It is generally admitted that Alvarez excelled in many qualities of a high order, in invention, in expression, and in design; and he is by his admirers compared with Canova. That he is less generally known than many of his more fortunate or more renowned contemporaries, is probably more owing to an ignorance of his works than to their inferiority. He was a member of the Institute of France, of the Academy of St. Luke of Rome, and of the academies of Carrara and Naples. He left three sons, who were allowed to retain a portion of their father's pension. The eldest, who promised to be a sculptor of ability, died at Burgos in 1830, in his twenty-fifth year.

There was another distinguished Spanish sculptor of this name, DON MANUEL ALVAREZ, who was born at Salamanca in 1727. After acquiring the rudiments of his art with two sculptors of Salamanca, he repaired to Madrid, and became the pupil of Don Felipe de Castro, the king's sculptor, whom he assisted in many of his works. He obtained the first prize of the academy of San Fernando in 1754, by which he was entitled to study in Rome, with a pension from the Spanish government, but he declined the advantage on account of the weak state of his health. In 1757 he was elected a member, in 1762 vice-director, in 1786 director of the academy of San Fernando; and in 1794 sculptor to the king. He died in 1797, generally regretted, in the seventieth year of his age. His statues and busts are very numerous in the churches, palaces, and monasteries of Spain, especially at Salamanca, Toledo, Zaragoza, and Madrid. Alvarez was commonly called by his fellow-artists El Griego, or the Greek, on account of the purity and vigour of his design, and his accuracy of execution—a great compliment.

(*Archive für Geschichte*, &c., 1829, No. 15; *Seminario Pintoresco Español*, No. 52; Cean Bermudez, *Diccionario Historico de los mas Ilustres Profesores de las Bellas Artes en España*.)

ALVEOLI'TES (Lamarck), a genus of fossil Polypiaria, from the cretaceous and tertiary strata.

AMALTE'O, POMPO'NIO, a distinguished painter of the Venetian school, born at San Vito in the Friuli, in 1505. He was the scholar of Pordenone, and painted much in the style of that master, though he was less bold in execution and inferior to him in invention. His Three Judgments however in the court of justice or loggia at Ceneda, which were completed in 1536, were long supposed to be the works of Pordenone, both through their style and the misstatement of Ridolfi. They are the Judgment of Solomon, the Judgment of Daniel, and a Judgment of Trajan, and are considered Amalteo's masterpieces.

Vasari praises, in the Life of Pordenone, some frescoes by Amalteo in the Castle of San Vito, for which he was ennobled by Cardinal Grimani, the signor of San Vito, and patriarch of

Aquilea. Amalteo was distinguished for good drawing, a quality rare among the Venetian painters.

Pomponio's brother and pupil, GIROLAMO, had also great ability for painting, but he generally painted small pictures highly finished. He died young, or otherwise, says an old writer, he would have rivalled Pordenone in reputation. By which observation we may infer, with Lanzi, that the story told by Ridolfi about his being induced to give up painting and to turn merchant, through a promise of an allowance of 100 ducats per annum from Pomponio, is not true. The meaning of the story is, that Pomponio was jealous of his brother. It seems that such a transaction did take place between Titian and his brother. Amalteo's paintings in fresco and in oil are very numerous in and about the district of Friuli, but he was unequal: many of his pieces have very little merit. He had several scholars, some of whom distinguished themselves. One of his pupils, Gioseffo Moretto, married his daughter Quintilia, who likewise painted and executed some works in sculpture. The date of Pomponio's death is not known, but it was probably prior to 1588, according to the following inscription upon a picture at San Vito:—'Inchoavit Pomponius Amalteus, perfecit Joseph. Moretius, A. 1588.'

(Altan, *Memorie intorno alla Vita di Pomponio Amalteo*, in the *Opuscoli Calogeriani*, vol. xlviii.; Renaldis, *Della Pittura Friulana*; Lanzi, *Storia Pittorica*, &c.)

AMAN, JOHANN, Hofarchitect at Vienna, was born at St. Blasien in Baden, in 1765. While the works of the minster at St. Blasien (completed in 1784) were going on, they were his constant study, and inspired him with the earnest desire of applying himself to architecture as his future profession, which wish the liberality of the Prince-bishop Gerbert enabled him to realize. That prelate became his patron, and placed him under suitable instructors, not for architecture alone, but also other branches of art. His proficiency in one, and that not the least difficult of them, must have been rapid, for in 1788, when only twenty-three, he executed the twelve painted glass windows for the new minster, in the style of antient works of that kind, on which occasion however he had the benefit of the precepts of Anton Pfluger, a brother of the order, who had discovered a mode of preparing colours for glass-painting, which Aman here made use of. This work being completed, his patron sent him to Vienna, whence, after studying two years and obtaining the first premium at the academy, he returned to Baden. His practice as an architect commenced in 1791, when he was employed by the Austrian 'Bau-direction' to erect a church and parsonage-house at Freyburg. In 1793 his first patron's successor, the Prince-abbot Ribbele, sent him for further improvement to Rome, where, besides pursuing his more immediate studies, he profited by the access afforded him to various libraries and cabinets of antiquities, and also by his acquaintance with the learned architectural archaeologist Hirt. He returned to Germany in 1795, but did not long remain in Baden, for in the following year, when the French crossed the Rhine, he betook himself to Vienna, nor was it long before he there found an opportunity of displaying his talent in a building erected by him near the Rosenthurm, for the reception of the Müller collection (1797). Whatever it was in itself, for merely the bare fact is mentioned, it had the effect of recommending him to the favour of the Emperor. In 1799 he was employed by Schikaneder and Zitterbart to design a new theatre for them, but he does not seem to have been engaged for it any further, since the building is said to have been spoiled by many deviations from the original plans. During the next year or two he was occupied on some public improvements, viz. those of the Hohe Markt, the two Dorotheen Hofe, &c., and on the death of Prosche in 1803 was appointed his successor as Hofarchitect. This led to his being employed (1806) to prepare designs for a new theatre at Pesth, the first stone of which was laid in 1808 and the house opened in 1812. From 1810 to 1819 he was chiefly occupied with repairing St. Stephen's spire, and restoring and embellishing upon an extensive scale the buildings of the celebrated imperial villa of Schönbrunn, besides which he prepared the designs and model for a new court theatre (1817). Except that he was afterwards employed upon various improvements at the imperial palace, Vienna, nothing further is recorded of him, nor are any particulars given as to his personal history: therefore his family circumstances are not known. He died in 1834.

(Nagler, *Künstler-Lexicon*; *Conversations-Lexicon für Bildende Kunst.*)

AMA'TO, GIOVANNI ANTONIO I
painter of the early half of the sixteenth ce
the best of the Neapolitan painters, was b
1475. His master is not known: he seems
himself chiefly by studying the works of Ma
died in 1485, and an altar-piece of Pietro P
in the Cathedral of Naples.

Amato was a remarkably pious man, and
stitious, for he never commenced a picture
and Bambino, his most favourite subject, w
the sacrament, and thus purifying himself
He carried his feeling of propriety so far
wrong to paint even a partially naked wom
with this feeling he refused to paint the
triumphal arch which was erected in hono
when he visited Naples: he recommended
to the authorities in his place.

Though as a painter he lived chiefly in th
tury, his style is more that of the quattroce
similar to that of Perugino, but, with equall
the forms of Amato are fuller than those o
painted in oil and in fresco, but his frescoes
disappeared: they have either been whit
disappeared in the repairing of their loca
picture is considered to be the Dispute on
the Cathedral of Naples.

Amato was a man of general acquireme
much of his time with assiduity and delight
of letters. He wrote a Commentary upon di
the Sacred Scriptures, which is said to
prized even by the clergy. These writings
to the Cavaliere Massimo Stanzioni, who spe
Dominici endeavoured in vain to identify the
Naples in 1555, aged eighty.

Of Amato's numerous scholars, his own ne
name, born in 1535, was one of the most di
was called Il Giovane, the Young, to disting
uncle, who however was himself sometimes c
or the Elder. The nephew after the de
studied with Gio. Bernardo Lama, an olde
elder Amato. His best work is a large and
piece of the Infant Christ, in the church
Poveri at Naples: he was a beautiful colour
Naples in 1598.

(Dominici, *Vite de' Pittori, &c. Napolita*

AMBERGER, CHRISTOPH, a celebr
painter of the sixteenth century, was of a fa
in the Ober Pfalz, whence his name; but A
was, according to Von Mechel, born at Nürn
His father was a stonemason, and his grandfa
in wood at Amberg. Nothing is known of
history previous to 1530, when he was alre
some note and in great employment at
works which he executed at this time howeve
distemper, a circumstance which Sandrart par
as it is a very perishable style, for he says
deserving of great praise. He painted the
houses in this manner; and, upon canvas, tw
the history of Joseph in Egypt, which are st
There is also in the gallery of Augsburg a
same manner of the Emperor Maximilian, wh
attributed to Albert Dürer.

Amberger painted also in oil and in fresc
tures are chiefly portraits, much in the st
whose portraits he studied and copied. Fi
many of Amberger's copies pass as the origin
His historical pieces in oil are very small, an
hard manner and sharp Gothic style of the
many, without any feeling for aërial perspect
rules of linear perspective are well observe
his colouring is rich. His best works are at
Amberg, in the Church of St. Martin and in
convent there.

Amberger painted the portrait of the Emp
apparently twice, but certainly once, for a po
Amberger is in the gallery of Berlin, and a
inscription upon the picture it was painted in
second year, or in 1532.. Sandrart speaks of
was painted in 1530; but from the fact that
Titian this year at Bologna, he is not likely
himself to be painted again so soon, and San
be wrong, and the portrait he speaks of may
Berlin gallery painted in 1532. However, a

speaks, he says that Charles expressed himself ...ded with it, ordered thirty-six rix-dollars, three ...t Amberger asked, to be paid to him, gave him a ...n and medal, and said that it was as good a picture ...e Titian had made of him, which had cost him one ...rix-dollars.

...ger is generally supposed to have died about 1563 at ...: he was however still living in 1568 according to ...ial records in that place. As in type 3 is often ...for 8, and vice versâ, the commonly received date ...y have originated in a misprint of 1568, which was ...e year of his death.

..., *Teutsche Academie*, &c.; Mechel, *Catalogue des ... de Vienne*; Waagen, *Gemälde Sammlung zu ...ber, Künstler-Lexicon.*)

...PTERUS (Agassiz), a genus of fossil Ganoid ... the coal formation of Edinburgh.

...SEMIUS (Agassiz), a fossil fish, from the ...rthamptonshire.

...URUS (Agassiz), a genus of fossil fishes, from ...Somersetshire.

...ICAN ANTIQUITIES. At the commence... the present century the existence of antiquities in ...was hardly known in Europe, if we except those in ...ity of the town of Mexico, and at a few places in the ...f South America. But since that time we have be...quainted with such a number of antient monuments, ...y bid fair to exceed those of the other parts of the ...sia excepted. The countries formerly subject to ...e now been laid open to unlimited investigation, and ...s of North America where antiquities exist have ... settled within the last sixty years by Anglo-... In the last-mentioned countries the monuments ...ent population are generally overgrown with forest-...h concealed their existence until the country was ...red.

...th American antiquities are of two descriptions: ...ither fortifications or mounds. The fortifications ...nd to the east of the Appalachian Mountains; but ... of them they occur in many places. The most ...in New York, on the banks of Black River, which ...ake Ontario at its eastern extremity; but here, as ...the Genesee county and other parts of New York ...all and difficult to trace. Farther west two ex...ems of fortifications may be traced. One extends ...thern portion of the state of Ohio, and is enclosed ... by the course of the river Muskingum, and on the ...e Miami. The most northern fortifications extend ...unty of Licking, to the vicinity of the place where ...gum river originates. Near Newark in Licking there ...ts, enclosing from twenty to forty acres each, and ...f earthen walls from eight to thirty feet high. Two ...ts are perfect circles, one a perfect square, and the ... octagon. These forts are severally connected by ...ing between parallel walls, and communicate by ...s with some creeks. Other less extensive fortifi... in Perry county, but those near Marietta, near ...ce of the Ohio and Muskingum, occupy a consider-... These are the antient fortifications in the valley ...kingum. In the valley of the Scioto a square fort ...ateways is united to a circular fort surrounded by ...nd a deep ditch between them. The town of ... in the county of Pickaway, is partly built in the ... Extensive works of a similar kind exist on ... in the county of Ross, west of Chillicothe; and ...e confluence of the Scioto river and the Ohio, ...outh. There are several isolated fortifications to ...e Little Miami river, and in the country between ...d the Great Miami.

... system of fortifications occurs on the banks of the ...but we are not so well acquainted with the lo...ere are several forts in the vicinity of St. Louis, ... of the Missouri river, and they extend thence ...ward. On the banks of White River in the ...ansas there is a wall which encloses an area of ...hich is equal to a square mile, and in its centre is ...n of a large circular building, supposed to have ...e.

...e forts, like the pyramids of Mexico, face the ...ts. When they have only one entrance, it looks ...east. The walls are usually made of earth, but ... one or two instances where they are of stone. ... more precise idea of their construction and disposition, we shall give an account of the works near Marietta. They consist of several walls and mounds of earth, in direct lines, and in square and circular forms. The largest square fort contains 40 acres, encompassed by an earthen wall from 6 to 10 feet high, and from 20 to 30 in breadth at the base. On each side are three openings, at equal distances, resembling 12 gateways. The entrances at the middle are the largest, particularly on the side next to the Muskingum. In front of this gateway is a covered way, formed of two parallel walls of earth, 231 feet from one another. These walls at the most elevated part on the inside are 21 feet in height, and 42 in width at the base, but on the outside they average only about 5 feet in height. This covered way forms a passage of about 20 rods in length, leading by a gradual descent to the low grounds, where at the time of its construction it probably reached the river. The walls commence 60 feet from the ramparts of the fort, and increase in elevation as the way descends to the river, and the bottom is rounded in the centre in the manner of a well-formed turnpike-road. In the interior of the fort are three square mounds. One at the north-west corner is an oblong square, 190 feet long, 132 feet broad, and 9 feet high, level at the summit, and even now nearly perpendicular at the sides. Another elevated square is 150 by 120 feet, and 8 feet high, and similar to the other, except that instead of an ascent to go up by on the side next the wall, there is a hollow way 10 feet wide leading 20 feet towards the centre, and then rising with a gradual slope to the top. The third square mound is 180 by 54 feet, with ascents at the ends 10 feet wide, but it is not so high as the others.

... S., No. 13.

At a short distance to the south-east is another smaller fort, containing 20 acres, with a gateway in the centre of each side, and at each corner; these gateways are defended by circular mounds in front of them, either within or without the enclosure. Still farther to the south-east is a mound in the form of a sugar-loaf. Its base is a regular circle 150 feet in diameter and 21 rods in circumference. Its altitude is 30 feet. It is surrounded by a ditch four feet deep, fifteen feet wide, and defended by a parapet four feet high, through which is a gateway towards the fort 20 feet in width.

These fortifications are peculiar to the plains drained by the Ohio and Mississippi; in no other part of the globe are similar works found. Mounds or tumuli however occur in many other countries of Europe and Asia. In the countries bordering on Lake Erie they are of inferior size and fewer in number than in those which lie nearer the banks of the Ohio. It is believed that these mounds exist all over the countries between the Appalachian range and the Rocky Mountains, and as far south as the Gulf of Mexico. They vary greatly in their dimensions. Some are only four or five feet high and ten or twelve in diameter, whilst others rise to the height of 80, 90, and some more than 100 feet, and cover many acres. Their base is round or oval, and their shape that of a cone, but sometimes flat at the top. They are made either of stone or of earth. Many of them are in the vicinity of, and sometimes within the walls of the fortifications, and it is thought that some of them thus situated have been used as stations to discover the approach of an enemy. But it is evident that the greater number of them are sepulchral monuments. In most of the lower ones great numbers of bones have been found. In the more elevated tumuli only a skeleton or two have been found. In the monuments of the last description, some utensils and trinkets are usually found, as hatchets made of stone, vases of earthenware, vases and ornaments of copper, a little iron sometimes, and sometimes a small piece of copper plated, and very rarely a little gold. One of the larger of these tumuli is found on the banks of the Ohio, 12 miles below the town of Wheeling in Virginia. Its figure is a truncated cone, measuring 295 feet at the base, 60 at the top, and 70 in perpendicular height. The height appears to have been originally greater, and the form more regular. This mound was opened in 1839, and there were found in the centre two cavities, one towards the base and the other towards the top. In the lower cavity were found two skeletons in a standing position, but nothing else. In the upper cavity was a single skeleton and along with it 1700 ivory beads, 500 small sea-shells of the volute class; 66 pieces of mica, each of which contained four perforations, apparently for the purpose of uniting them, and five copper bracelets or arm-bands, but without being soldered at the points of junction. None of these relics evinced any artistical talent or acquirements beyond what are possessed by existing Indian tribes. But there was also found in this mound a small elliptical stone table, with 24 distinct characters arranged in parallel lines. It appears that they are not letters, but hieroglyphics. Some very high tumuli are found in the neighbourhood of St. Louis, and among them are two which have two or three stages or terraces, which are considered as important in an historical point of view, as they seem to connect the antiquities and consequently also the civilization of the antient tribes that inhabited the United States with those of Mexico; for these tumuli approach in shape to the teocallis of the Mexicans.

We pass to the Mexican antiquities. On the river Gila, which falls into the Rio Colorado, some large ruins are said to exist under the name of Casas Grandes. Humboldt considers these ruins as one of the temporary stations of the Azteks in their migrations from the north to the south, and he has given some account of them and the surrounding population according to the information published by two monks in 1792. These ruins have not been found since. It is true that nobody has sought for them, but the country in which they are supposed to exist has been traversed by several persons, who do not mention the high civilization of the Indian tribes inhabiting these regions. It appears that the country is uninhabited, and that being the case, ruins may escape the attention of travellers for a long time. But there are Casas Grandes in the state of Chihuáhua between 30° and 31° N. lat., where for several leagues the country is covered with the ruins of buildings, among which also some edifices of very considerable extent are met with. Numerous earthen idols somewhat resembling in style those of Egypt have been disinterred, and also jars and other articles. But those ruins have not yet been examined and described by any scientific traveller. Humboldt considers them also as one of the stations of the Azteks, and the extent of the ruins favours his statements. The antient buildings within the limits of the Mexican confederation are the teocallis, or houses of the gods. They are four-sided pyramids, rising by stages or terraces to a considerable elevation. When the Spaniards first visited the capital of the Azteks, they found there an immense edifice of this kind, which however was destroyed by the fanatic zeal of some Spanish clergymen, when the new town of Mexico was founded. There however still exist a considerable number of such buildings. A group of such pyramids still exists in the Vale of Mexico at Teotihuacan, about 20 miles north-east of the capital. It consists of two large pyramids which were consecrated to the sun and to the moon, and are surrounded by several hundred small pyramids, forming regular streets, which run exactly north and south or east and west. The larger of the two pyramids is more than 160 feet in perpendicular height, and the other is more than 130 feet high. The base of the first is 900 feet long. The small pyramids which surround the two grand ones are from 30 to 40 feet high, and according to the tradition of the natives, they were used as burial-places for the chiefs of the tribes. The two large teocallis have four stages or landings. The interior of these edifices consists of clay mixed with numerous small stones; but this nucleus is enclosed by a thick wall made of a kind of pumice-stone. It is stated that on the platform of these edifices two colossal statues of the sun and the moon were originally placed. East of these teocallis of Teotihuacan, and not far from the shores of the Gulf of Mexico, is the pyramid of Papantla, situated in a thick forest. The form of this teocalli, which has still six stories, but formerly had probably seven, is more tapering than any other monument of this kind yet discovered, but the height is only 57 feet, and the base only 25 feet on each side. It is built entirely of hewn stones, of an extraordinary size and very well shaped. Three staircases lead to the top; the stages are decorated with hieroglyphical sculptures and small niches arranged with great symmetry.

The largest, most antient, and most famous of the Mexican teocallis is that of Cholula. It has four stages of equal height, and its sides front exactly the four cardinal points. It is 178 feet high, and each of its sides at the base is 1448 feet long. It is stated that on the top of this pyramid an altar originally existed, dedicated to the God of the Air, but the place is now occupied by a small Christian chapel. It is also stated that this teocalli had not been erected by the Azteks, the ruling nation at the arrival of the Spaniards, but by the Tolteks, who had been the ruling nation before their time, and that at the epoch of the arrival of the Spaniards it had been standing 500 years. The teocallis or Mexican pyramids were at the same time temples and burial-places, and it appears that the small chapel at the top of the pyramids was the principal part of them. This part, which was the temple, has mostly been removed and replaced, as in the case of the teocalli of Cholula, by a small Christian church, and up to 1840 we had no idea
of the form of these structures at the top. But in that ye
Stephens, an American traveller, found a well preserv
calli among the ruins of Ocosingo, in the province of C
in Mexico, and it appears that the edifice by which the
ture is crowned is in a comparatively good state of pr
tion. This edifice certainly differs greatly from wha
expected to be, and the account of it in Mr. Stephen
is very interesting. The ruins of Santa Cruz del
in Central America bear a great resemblance to the
of Mexico and Chiapas, though it is well known
town was a fortress, and not a temple. It would how
pear that the different nations who succeeded one an
the possession of Anahuac had adopted the same kin
struction in their fortifications which we find in their
buildings. This is proved by the fortress of X
situated not far from the town of Cuernavaca, on
leading from Mexico to Acapulco. This is an isol
386 feet high, which has been surrounded by a
divided by the work of man into five stages or terrac
are coated with masonry. The whole forms a
pyramid, whose four sides exactly front the fou
points. On the top of the hill is a flat space, cont
than 12 acres, on which there are the ruins o
building, which may have been a kind of watch-ho

The antiquities hitherto noticed differ in chara
much from those of the Old World, except that
finds a resemblance between the Mexican teocallis
of the pyramids of Sakkarah in Egypt. But the
ruins of buildings, which evidently have not been
ent from those erected in several parts of Europe.
time when Humboldt visited America only one
ruins of this description appears to have been k
Mexico, at Mitla or Miguitlan, south-east of Oaxaca,
go under the name of the Palace, and of which he gives
a detailed description. But since he wrote his 'Views
Cordilleras,' &c., numerous ruins of this kind have be
covered. It does not however appear that, with the ex
of the ruins of Mitla, any of this description have bee
in Mexico, or in the country west of the isthmus of T
tepec, nor on this isthmus itself; they lie to the
it, in countries which may be considered as forming
the peninsula of Yucatan. Mr. Stephens visited 44
cities, though his stay in the country was short. H
opinion that these structures were erected by the anc
the present population, and at a period little anterior
arrival of the Spaniards, and the great number of th
certainly favours his opinion. It is not known ho
there may be in other parts of the country, but they
tainly very numerous between 19° 45′ and 20° 45′, an
cially between 20° and 20° 20′, on both sides of a lo
of high grounds, which in these parts runs from W.N
E.S.E. Along the southern base of this ridge groups
occur at distances of five or six miles from one anoth
appear to form a continuous series. The ruins ar
numerous at Uxmál, Kabáh, Gabna, Kewick, Lab
Chichen. Though no ruins of considerable extent ap
the shores of the Bay of Campeachy, some are found
of the Bay of Honduras at Taloon (20° 12′ N. lat.),
its neighbourhood at Tancar. Some inconsiderabl
exist in the island of Kankun, not far from Cape Cato
most north-eastern point of Yucatan.

These antiquities are called ruins of cities, and w
expressly stated that in some places several square
are encumbered with ruins of buildings in a state
decay, and with rubbish. But it must appear a m
surprise that so many cities were found in a countr
had no commerce and was almost entirely destitute o
factures. That these countries had no foreign com
evident from their want of sea-faring vessels above th
a moderate canoe, and still more from their entire w
general currency. No coins have ever been discov
America, nor any thing which could have served for
pose of money. If there did not exist a commercia
course between Yucatan and the neighbouring count
places of deposit for the goods to be exported w
required, nor for such articles as were imported fro
countries, and could not be consumed in the country.
such circumstances it is natural that the exchange o
being confined to those produced in the country its
effected without the aid of a metal currency, was li
barter, and did not require the intervention of a third
but every article passed directly from the hands of t
ducer into those of the consumer. The degree of

the inhabitants had acquired was certainly such
y the existence of several mechanical arts and
it is not easy to comprehend how any article could
required to such an extent as to constitute a regu-
of manufacturing industry. The state of society
did not require towns, neither on account of com-
for the establishment of manufactures, and yet we
ated that the number of towns is great. It is evident
the government of the country a single town would
sufficient. We may therefore presume that these
not the ruins of towns; but of what kind of build-
are the remains it is very difficult to ascertain, as
entirely unacquainted with the state of society in these
when those structures were erected.
called them ruins of cities, probably under the first
with such extensive remains make on those who
But whenever they have taken the trouble to make
of the ruins, it is found that there is only a small num-
buildings. There is always one building of great extent,
resembling the palaces of Europe than common dwell-
ings; and this edifice has received different names. At
places it is called the Governor's House, and at others
's House. This edifice exhibits a great quantity of
ctural embellishments. There are columns of different
corridors, paintings, ornaments in stucco, &c. The
the building is 300 feet long, and its width frequently
200 feet. The whole is so disposed as to form
four terraces, the top of the whole being a large
constituting the roof, which is enclosed with a low
he front of these buildings is generally ornamented
rous sculptures. This edifice is evidently the prin-
t in every group of ruins. It is surrounded by
er buildings, the use of which has not been ascer-
Among these outbuildings, as it were, sometimes an
und which, according to our ideas, may have been
but nothing has been produced which proves them
en places of public worship. Generally there is
sometimes two pyramids near the palace, but even
uncertain. As the ruins are not found in places
been the sites of extensive towns, we are inclined
at they have been the residences of a ruling priest-
at the political constitution has been founded on
principles. But perhaps they have been baronial
nts. It is known that the political constitution
rested chiefly on feudal principles, and that the
nation were bound to give a considerable part
and labour for the advantage of an hereditary
We may therefore presume that this was also
in Yucatan; and such a state of society appears
been much favoured by the peculiar character of
y, where water for irrigating the fields can only be
at the expense of great labour. [YUCATAN, P. C.,

st famous of these ruins are those of the city of
as it is called, which lie near the boundary-line be-
xico and Central America. These ruins were dis-
the middle of the eighteenth century, and from that
been always stated that they cover a space of
in circumference, and contain public works of great
e. We now know that the ruins consist only of a
ing called the Palace, and four or five other build-
rior size, in a tolerable state of preservation, with
of a few others so utterly dilapidated that it
e to say what they have been. The palace stands
ial elevation of an oblong form 40 feet high, 310
and rear, and 260 feet on each side. The palace
with its face to the east, and measures 228 feet in
feet deep. The height is not more than 25 feet,
a broad projecting cornice of stone all round.
o windows. The front contains 14 openings re-
tes, each about nine feet wide, and the intervening
ween six and seven feet wide. The building is
of stone, with a mortar of lime and sand, and the
has once been covered with stucco and painted.
re ornamented with spirited figures in bas-relief,
of them remain. The outer walls of the palace,
are formed by two parallel corridors running
n all the four sides; they are about nine feet wide.
re of cement, as hard as the best in the remains of
and cisterns. The space enclosed by these cor-
ns four court-yards, separated from one another
of less extent, several sets of apartments, but
ain by passages between the corridors and rooms. The number of the apartments exceeds 20. The bas-reliefs in stucco and in stone, in the court-yards of the palace, attract attention partly on account of the manner in which they are executed, and partly on account of the style of the figures. In one of the court-yards is a tower whose base is 30 feet square; it has three stories, and is conspicuous for its height and proportions. Nearly contiguous to this great palace is one of inferior dimensions. It stands on a pyramidal structure 110 feet high on the slope. This building is 76 feet in front and 25 feet deep. It has five doors and six piers, all standing. The whole front was richly ornamented in stucco, and the corner piers are covered with hieroglyphics, each of which contains 96 squares. Besides these two tablets, there are in the corridors of the interior three others, likewise covered with hieroglyphics. The other two or three buildings are less remarkable, but they also contain a few bas-reliefs of value. All these buildings stand on the top of artificial mounds resembling pyramids, and the slopes of these mounds have evidently been faced with stone, which however has been thrown down by the growth of the trees which now cover them.

The ruins of Santa Cruz del Quiché are connected with the conquest of this part of the country by the Spaniards, and are therefore the only remains which have an historical value. They are situated near 15° N. lat., at the southern extremity of the peninsula of Yucatan. These ruins are far from being extensive, and very little remains of the work erected by the natives before the arrival of the Spaniards, for the purpose of rendering this place impregnable. These ruins are on a hill with a flat summit, which is surrounded on all sides by deep ravines. A part of one of the ravines is stated to have been made by the natives; and it is said that upon it 40,000 men had been employed at one time. The flat top of the hill was once occupied by the palace of the kings of Quiché, by a seminary or military school, and other buildings belonging to the royal house of that name, but at present nothing is found there except confused and shapeless masses of ruins.

The last-mentioned antiquities are the work of the Tolteks, a nation which appears to have once been in possession of nearly the whole of the Mexican Isthmus, and which even at the arrival of the Spaniards was the predominant nation east of the isthmus of Tehuantepec, where the kingdoms of Quiché and Katchequil were the most powerful states. It is stated that the Tolteks had attained a higher degree of civilization than the Azteks, and the ruins of their buildings appear to confirm this opinion. It is however problematical if the ruins found east of the isthmus of Chiquimula belong to the same people, as they are distinguished from all other American antiquities by very marked characteristics. The most extensive of these ruins, and certainly the most remarkable, are those of the city of Copán, which are on the banks of the river of the same name, which joins the river Motagua from the south. This city was in existence at the time of the arrival of the Spaniards, and was destroyed by them on account of an insurrection, which happened among the natives some years after they had submitted to the foreigners. At present no human habitation is found among the ruins, and the whole site of the town is overgrown with large trees and underwood. The ruins are dispersed over a space about a thousand feet in length and five hundred in width, and consist of the remains of strong and high walls constructed of massive hewn stones, and of several pyramidal buildings, but there are some square altars, of which one is sculptured on the four sides and the top, and of a considerable number of stone idols, most of them still standing, though a few have fallen to the ground. These idols have the shape of columns, and are from twelve to twenty feet high. They are mostly covered with sculptures on all four sides, from the base to the top. The sculptures are very rich, and made with great art and labour. They are all of a single block of stone. Most of them present a human figure fantastically dressed and adorned, but they differ greatly in design. In a few the backs and sides are covered with hieroglyphics. The altars are also of a single block of stone. They are in general not so richly ornamented as the idols. The sculpture on the best preserved of these altars is in bas-relief, and this is the only specimen of that kind of sculpture found at Copán, all the rest being in bold alto-rilievo. It is six feet square and four feet high, and the top is divided into thirty-six tablets of hieroglyphics. The sides of this altar are covered with sculptures representing each four human figures in sitting attitudes. There are perhaps no ruins which show greater art and ingenuity and more labour than the ruins of Copán, and they may in these respects be compared with the temples of Elephanta and Ellora in Hindustan. It appears that other ruins of a similar description occur in this part of Central America. We know at least that some idols of stone are found at a place called Quirigua, which is situated on the banks of the river Motagua, several miles east of Encuentros, which is the place where the river is reached by the great road leading from the port of Ysabal to the town of Guatemala. The idols are exactly in the same style as those of Copán, but they are two or three times as high. At this place is also found an obelisk, or rather a carved stone, twenty-six feet above the ground and probably six or eight feet under. The sides represent figures of men, and are finely sculptured.

It is probable that other ruins will be found in the states of Honduras and Nicaragua, as these countries too, at the time of the Spanish invasion, were inhabited by nations which were not savages, but acquainted with some of the arts of civilized life. A modern traveller states that as far south as the district of Chontales, which lies north-east of the Lake of Nicaragua, monuments of antiquity exist, but he gives no description of them, nor does he state of what those monuments consist. Farther to the east and in the state of Costarica and on the Isthmus of Panama no monuments have yet been discovered, and it is not probable that such relics will be found, as this part of America was inhabited at the arrival of the Spaniards by tribes which had scarcely emerged from the lowest state of civilization. No antient monuments are met with in the republics of Venezuela and New Granada, though it is certain that the Muyscas, a nation inhabiting the table-land of Cundinamarca, or of Bogotá, had made considerable progress in civilization. There are however a few antient edifices in Ecuador, on the table-land of Quito. Not far from the volcano of Cotopaxi are the ruins of a large building called the Palace of the Incas. It is a square measuring on each side about thirty yards, and it has four doors. The interior is divided into eight apartments, three of which are still in tolerable preservation. Not far from the mountain-pass of Assuay is what is called the Fortress of Cañar, a building consisting of a wall of very large stones, about five or six yards high. It has an oval form, of which the greatest axis is nearly forty feet long. A modern traveller mentions an antient fortress called Huikhay, situated not far from the town of Jauja in Peru, which evinces a great degree of military architecture, but it is rapidly going to decay. The antient Peruvian monuments are not, like those of Central America, distinguished by sculpture and rich ornaments, but by solidity and simplicity, as is proved by the great road of the Incas, running from Quito to Cuzco and farther southward, and by the massy stone buildings which are dispersed over the mountainous countries enclosed by the ranges of the Andes. There are also the ruins of some destroyed towns in the lower country along the Pacific, but they are in such a state that no traveller has thought it worth his while to give us a description of them. Neither in Brazil nor in Paraguay and the states of La Plata have antient monuments been discovered.

This short and rapid survey of American Antiquities is incomplete. Such as it is, it shows the immense extent of country over which they are dispersed, and gives a slight indication of the great difference in character which they exhibit. This difference must be an additional stimulus to investigate their origin and use, to all those who take an interest in the history of the human race; but the study of American Antiquities presents much greater difficulties than that of the antiquities of other quarters of the world. There is no history of the nations who erected them, nor are there any facts on record with which we can connect them. We do not know by whom and under what circumstances these remarkable monuments were erected; nor do we know what purpose they were to answer. When we investigate the antiquities of Europe we find in most cases that these circumstances can be ascertained. Either the erection of these buildings is recorded in history, or some inscription or other indication informs us of the time in which they were built or by whom. There are a few antiquities, such as the Celtic remains, as to which some discrepancy of opinion exists, but even here we can approach to probable conclusions. The monuments of Egypt are covered with the names of kings who erected or embellished them, and the Greek historians have recorded such traditions as were current in Egypt when they visited that country. We cannot say so much of the rock-cut temples and other great monuments of Hindustan. Few inscriptions are found on them, and the nations who erected them are remarkable for their neglect in recording historical facts. But the sculptures which adorn these [illegible] ments are so closely connected with the present state of [illegible] in that country and with the religion of the people, [illegible] may be asserted that they mutually explain one another, [illegible] that a person who is thoroughly acquainted with the [illegible] and their religious institutions and opinions is thereby [illegible] to understand the sculptures on the monuments. In this [illegible] nearly all the antient monuments in the Old World [illegible] explained by the aid of historical records or inscriptions [illegible] their evident connection with the present state of the [illegible] ants. But it is different with the monuments of the [illegible] World. They are not mentioned in historical records, [illegible] do they contain inscriptions. It is true that many of [illegible] contain hieroglyphic characters, which were probably [illegible] cient to convey some historical information to the [illegible] which erected them and knew their signification. [illegible] are dead letters. We do not know the state of [illegible] people who erected them, and we are [illegible] the meaning of the hieroglyphic characters. [illegible] cannot derive from the present condition of the [illegible] America anything which can explain their [illegible] Their condition has been abruptly and greatly [illegible] more so than that of the nations of Europe [illegible] tries were inundated by the barbarous nations [illegible] fourth and fifth centuries issued from the central [illegible] and the north of Europe. The Spaniards, who [illegible] most civilized portions of America, had urgent [illegible] for exterminating all those families which had [illegible] degree of authority with the natives, and to reduce the [illegible] population to a state of degradation; and what they [illegible] from political motives, they finished from religious zeal. [illegible] quite impossible to connect the present condition of the [illegible] population of Yucatan with the ruins discovered at [illegible] or Chichen, or to draw from it any facts which can [illegible] the monuments, though it is probable that these [illegible] were erected by the ancestors of the present native [illegible] These difficulties are still greater in the United States [illegible] North America, where it is certain that the native [illegible] which lately occupied those countries in which the [illegible] exist, did not erect them, but that they are the [illegible] by a nation which in some remote times was in [illegible] the country, and which had attained a higher degree of [illegible] lization than the present Indian population. A slight [illegible] quaintance with the monuments and the present Indian [illegible] is sufficient to show that no kind of connection can have [illegible] between them, and the Indians themselves declare that [illegible] are ignorant of the time when and the purpose for [illegible] these monuments were erected.

(Humboldt, *Vues des Cordillères et des* [illegible] *Peuples indigènes de l'Amerique*; Priest, *American* [illegible] *quities and Discoveries in the West*; Bradford, [illegible] *Antiquities and Researches into the History of the Red* [illegible] Stephens, *Incidents of Travel in Central America,* [illegible] *and Yucatan*; Stephens, *Incidents of Travel in* [illegible] Norman, *Rambles in Yucatan*; Hardy, *Travels in* [illegible] Vetch, 'On the Monuments and Relics of the Antient [illegible] bitants of New Spain,' in *London Geog. Journal*, vii.

AMIGO'NI, JA'COPO, one of those painters [illegible] some chance not quite apparent, obtained a popularity [illegible] life time immeasurably beyond his deserts according to [illegible] modern critics. He was born at Venice in 1675. [illegible] had acquired some reputation in Venice, he added [illegible] ably to it in the service of the elector of Bavaria, by [illegible] works he executed in Munich, and particularly some [illegible] ceilings at Schleissheim. He met with equal success in [illegible] don, where he came in 1729, and painted a few [illegible] fresco, and many portraits in oil. He painted also [illegible] and the Muses over the orchestra of the then new [illegible] Covent Garden. He returned to Venice in 1739, [illegible] saved 5000*l*. during his ten years' stay in London. In [illegible] he went to Madrid with the appointment of painter [illegible] king, Ferdinand VI. He died at Madrid in 1752, [illegible] two of his daughters were still living in 1773, both [illegible] one of them, Signora Castellini, practised as a [illegible] in crayons.

Amigoni's frescoes are purely ornamental, mere [illegible] decorations; the following is Walpole's critique upon [illegible] style, severe, but perhaps not much less true than [illegible] 'His manner was a still fainter imitation of that [illegible] master Sebastian Ricci, and as void of the glow of life as the Neapolitan Solimena; so little attention do the [illegible] Venetian painters pay to Titian, Tintoret, and Paul Veronese, even in Venice. Amiconi's women are mere chalk, as if he

ted from ladies who paint themselves. Nor
orst defect; his figures are so entirely without
at his historical compositions seem to represent
in a tragedy, ranged in attitudes against the
up. His Marc Antonys are as free from pas-
ipios. Yet novelty was propitious to Amiconi,
years he had great business.'

some small conversation pieces in the style of
Dutch painters, which Lanzi prefers to his larger
e latter one of the best is a Visitation, at the Padri
o at Venice. He engraved a few prints for his
nd instructed Joseph Wagner in engraving, who
ny of Amigoni's works. The prints after Ami-
y numerous; Heineken enumerates 127, including
s of several crowned heads, among them Peter the
d one pope, Benedict XIV.

i, *Della Pittura Veneziana*, &c.; Bermudez, *Dic-
torico*, &c.; Walpole, *Anecdotes of Painting in
&c.*; Lanzi, *Storia Pittorica*, &c.; Heineken, *Dic-
des Artistes*, &c.)

AN, JOST, a very celebrated Swiss engraver and
f the sixteenth century, born at Zürich in 1539.
Swiss by birth, he was a German by adoption, for
ed himself in Nürnberg in 1560, and gave up his
zenship in Zürich in 1577. As is the case with
old German masters, little or nothing is known
n's life: many writers speak of him as a painter,
not a single painting of his known: Sandrart
ayr speak of him as a painter on glass only.
gns are extremely numerous; a painter of Frank-
me of Keller, who lived with Amman four years,
that the drawings he made whilst he was with
a large waggon. Though he did not live long,
very artist that preceded him in the number of
There are about a thousand wood-cuts attri-
, but whether he cut all or even any of them
known. Bartsch also doubts whether all the
uted to Amman are etched by him; he supposes
been etched by Stephen Hermann. His designs
eared as the illustrations of books; few books
d in Amman's time without illustrations. Sieg-
bend of Frankfurt was the publisher of most of
rks; many of them were published after his
ied at Nürnberg in 1591.

comprise nearly every subject—History, sacred
general costume, military costume, field-sports,
y, heraldry, and other subjects. His drawing is
d, and in the costume very accurate and evidently
ature: his animals also are executed with much
t, speaking of his style of engraving, says, 'It is
ided; but if his strokes are more regular than
h the engravers on wood of his time, it is to be
much as he gained by the pains he took with
s execution, he lost in freedom and spirit.'

most remarkable works is Πανοπλία, published
furt in 1564; again in 1574, and again in 1588.
ery scarce; it is a description of all the principal
ccupations of Amman's time, containing 115
n wood of various mechanics and tradesmen, &c.
e costume; he has represented himself as the
ans Sachs used Amman's plates for his work
ntliche Beschreibung aller Stände auf Erden'
Description of all Ranks upon the Earth'),
nkfurt in 1568 and 1574.

markable work is 'Icones Livianae,' &c., pub-
Frankfurt, in 1572 and 1573, containing 103
f Livy's 'Roman History.' They were pub-
th some additions and a German translation of
in the same place; and again at Strassburg
e first cut is a portrait of Feyerabend, the pub-

published also, in 1564, 103 illustrations of the
onastic costumes of the Church of Rome, with
ions; but three German editions have since
d. And also a book of female costumes with
Gynæceum, sive Theatrum Mulierum,' &c.,
86. Also in the same place, the books of
r, 1584, folio; a set of 12 illustrious women,
h Eve, on copper; and in 1587 a Dance of
Todten Tantz,' in 49 cuts; besides many other
merit or interest.

s also an author: he wrote a book on poetry,
culpture, which was published at Frankfurt, first in 1578, and later as a Manual of Painting, 'Artis Pingendi Enchiridion.'

(Sandrart, *Teutsche Academie*, &c.; Doppelmayr, *Historische Nachricht*, &c.; Strutt, *Dictionary of Engravers*; the *Dictionaries* of Heineken, Füssli, and Nagler; and *Le Peintre-Graveur* of Bartsch.)

AMMANA'TI, BARTOLOME'O, this distinguished sculptor and architect was born at Florence in 1511, and bred in the very height of the golden age of Italian art. Thus educated in such a nursery, with Baccio Bandinelli and Sansovino for his tutors, he could not easily fail to produce works worthy of his opportunities and his education. His father, Antonio da Settignano, died when Bartolomeo was young, but he left him master of sufficient property to be in a condition to choose his own profession and to follow it.

When Ammanati returned from Venice to Florence, Michel-Angelo was at the height of his reputation as a sculptor, and Ammanati became one of his most devoted admirers and imitators, and, like many other painters and sculptors, catching chiefly the defects of Michel-Angelo's style, fell into the error of treating the limbs as the most essential part of man. In this spirit Ammanati executed several works in various cities in Italy. He made three great figures at Naples for the monument of the poet Sannazzaro; a colossal Neptune for the Piazza di San Marco at Venice; a colossal Hercules at Padua; the Neptune of the Piazza del Gran Duca at Florence; and a colossal statue of Mount Apennine, 'Il Monte Apennino,' at Pratolino near Florence. The Neptune of the Piazza Gran Duca was ostensibly designed in competition with Benvenuto Cellini, the Fleming John of Bologna, and Vincenzo Danti; but according to Cicognara the competition had nothing to do with the Duke Cosmo's adoption of Ammanati's design; the duke, says Cicognara, did not even see the designs of two of the competitors.

Ammanati was also much employed in Rome by several popes,—by Paul III., Julius III., and afterwards by Gregory XIII.

During the interval between the two periods that he was employed by these pontiffs, he attained great fame at Florence as an engineer and an architect. He constructed the celebrated Ponte della Trinità, which spans the Arno in three light and elegant elliptical arches, calculated to allow the sudden floods of that river to pass without the slightest risk: it still exists, and has withstood lately (1844) the most impetuous flood that has visited the Arno for centuries, in which even the newly constructed iron suspension-bridge was swept away. The old Ponte della Trinità, which was replaced by the bridge of Ammanati, was destroyed by the floods of 1557. Ammanati made also some additions to the Pitti Palace, which had been commenced from a model by Brunelleschi, and has been finished only within the last ten years. At Rome he built the Palazzo Ruccellai, afterwards Ruspoli; the court and façade of the Collegio Romano, built for the Jesuits by order of Gregory XIII.; and the Palazzo Sacripanti for the Corsini family. His principal works of sculpture in Rome are the figures of Justice and Religion and the other sculptures of the tomb of the Cardinal del Monte in the church of San Pietro in Montorio.

Many of the works of Ammanati are naked, which, as he grew old, he seems to have deeply regretted; and he wrote a letter as an apology to the Academy of Florence, which was published in 1582, and in which he exhorts the rising artists to drape their figures, the representation of the naked being, as he then thought, offensive and injurious. Baldinucci has reprinted the letter. His wife, to whom he was married in 1550, was the celebrated Laura Battiferri of Urbino, distinguished as a poetess. She was a member of the Society of the Intronati of Siena. Her poems have been twice published, at Florence in 1560, and at Naples in 1694. She died at Florence in 1589, aged sixty-five. Ammanati survived her three years, and died, according to Baldinucci's copy of the inscription on his monument, in 1592, aged eighty-one. His body was laid near his wife's, in the chapel of San Bartolomeo, which he had prepared for the purpose, in the church of the Jesuits, San Giovannino, at Florence. He bequeathed the greater part of his property to the Jesuits.

There is in the library of the Florentine Gallery a manuscript by Ammanati, entitled 'La Città,' in which he has treated of all the buildings necessary for a city.

(Baldinucci, *Notizie dei Professori del Disegno*, &c.; Cicognara, *Storia della Scultura*.)

AMMODYTES, a genus of fishes belonging to the division of *Apodal Malacopterygii* and family *Anguillidae*. The body is very long and the head lanceolate. On the back is a dorsal fin extending nearly its whole length. The anal fin is also long; and the caudal, which is forked, is separated from both the dorsal and anal. Two species occur on the coasts of the British Islands, the *Ammodytes tobianus* and the *Ammodytes lancea*. The former is the larger, and is distinguished by the greater size of the head, and by the dorsal fin, which commences in a line with the extremities of the pectorals, whilst in the *A. lancea* it commences in a line with the middle of the pectorals. The Sand-Eel, by which name the first species is popularly known, attains a length of between 12 and 15 inches. When alive the back is of a dark bluish-green, and the sides and belly bright silvery-white. It frequents sandy shores in great numbers, but is capricious in its visits, more so than its congener. At the ebbing of the tide it buries itself with great dexterity and rapidity in the wet sands to the depth of from 4 to 6 inches, whence it is extracted by means of various instruments, such as peculiarly formed gripes and sickles with blunt edges, made for the purpose. It is much esteemed by fishermen as a bait, and is also sought after on many parts of the coast as an article of food, being very delicate eating when fresh, and excellent when dried in the sun and grilled.

The sand-launce, *Ammodytes lancea*, is a smaller species, and usually of a more brownish hue, with a tinge of red about the head. It is more abundant than the Sand-Eel, and has always been distinguished from it by the fishermen, though for a long time confounded with it by naturalists. The distinctions between the two species were first pointed out by M. Lesauvage of Caen. Both appear to be generally distributed through Northern and Western Europe. In Scotland the Sand-Eel is known by the name of the Horner, and in the Isle of Man the two species are distinguished from each other as the Grey Gibbon and Red Gibbon.

(Yarrell, *British Fishes*, vol. ii.; Parnell, *Fishes of the Frith of Forth.*)

AMMONIA—*Medical Properties of.* This alkali is distinguished from the others by the appellation of Volatile, because at the ordinary temperature and pressure of the atmosphere it never exists in a fixed state, but either in a gaseous form, in which case it immediately combines with any carbonic acid which it encounters in the air, or is absorbed by water or spirit, from both of which it is easily liberated, particularly if heat be applied. Having been formerly obtained by distillation of shavings of hartshorn or other animal matters, it is familiarly known under the name of Spirit of Hartshorn. The combinations with carbonic acid have the same properties as the pure alkali, in respect to volatility, and only a diminished degree of causticity.

The gas in an undiluted state is highly pungent, with a suffocating odour, is irrespirable, and irritates and inflames the animal tissues. (Christison.) Diluted by passing through the air, from which it absorbs moisture and carbonic acid, which serve further to lessen its acrimony, it is occasionally, but rarely, applied to the eyes, in some passive inflammations, and to keep up vigilance in cases of somnolence from narcotic poisons. This last mode of using it is scarcely to be recommended, as dangerous inflammation of the eyes may subsequently follow. Indeed all employment of even the less caustic forms of administration, when much insensibility exists, such as in faintings, epileptic fits, or from narcotic poisons, likewise in experiments on persons in the state termed mesmeric coma, requires great care. Fatal inflammation of the windpipe has ensued by merely holding carbonate of ammonia (smelling salts) or a handkerchief dipped in strong aqua ammoniae under the nostrils. (Nysten.) When it is to be introduced into the stomach, this should be done by means of the stomach-pump, to avoid any of it passing into the windpipe. Besides its local action, exciting inflammation and its effects, ammonia is itself poisonous, its secondary effect on the nervous system, particularly the spinal column, being sufficient to cause tetanic convulsions. Though Eau de Cologne may be grateful to adults, the vapour is unsafe for children. (See *Lancet* for April, 1844.)

Ammoniacal gas absorbed by water constitutes the *aqua* or *liquor ammoniae*. This is formed of two different degrees of strength: the one of a density of 882 at 62° F. called *fortior*, much too strong for any medicinal purpose, and only employed for some chemical purposes; the other of the density of 960, which also generally requires to be diluted further with water when intended for internal use, or with oils when for external use, as it is very frequently to form rubefacient liniments. The solution of the carbonate is likewise frequently employed
in combination with oils. These, if long applied, or
repeated, cause inflammation which terminates in
and ulceration.

Ammonia, when suitably diluted to be taken in
mach, causes a feeling of warmth, with increased
the nervous power. Hence it acts as a prompt
counter-poison to Prussic Acid, the bites of serpent
poison of many diseases, such as Cholera Asiatica,
fevers, at the commencement of which great d
the nervous system is observed. In lesser d
pression, such as the languor of hysterical
atonic gout, ammonia or its carbonates are daily
It is likewise employed to counteract acidity in
It must not be overlooked however that the
use of ammonia produces the same ill effects
alkalies when taken in excess. [ALKALIES, P. C

The salts of ammonia require a brief notice. T
of the different combinations of ammonia with
are too similar to those of the pure alkali to be
rately, except to state that carbonate of ammon
good emetic in the earliest stage of fever with gr
and is in smaller doses given freely through
fevers, sometimes in the effervescing form, e
action of the skin is desired. Citric acid is
cause it to effervesce.

Hydrochlorate of ammonia is little employ
country internally, but it may be beneficially used in
tion with cinchona bark in fevers. In large do
poisonous. It is however chiefly employed to fo
tient and evaporating lotions in conjunction with
spirit. For these it is most valuable.

Acetate of ammonia has little of the causticity of
alkali or the carbonates, neither is it volatile. It
quescent that it cannot be kept in the solid form, and
administered in weak acetic acid. This forms a mo
refrigerant at the commencement of slight inflamma
plaints, and if the patient be kept warm, generall
perspiration. For this purpose it requires to be fr
It is also a diuretic, but not much employed. Prope
with rose-water it forms a cooling eyewash, most gr
some forms of inflammation, to relieve the turgesc
remains, or even to remove turgescence which
been preceded by inflammation. Scarpa though
against commencing amaurosis.

AMMO'NIACUM—*Medical Properties of.*
resin is fully described in P. C., vol. i. p. 459,
ascribed, on the authority of the former edition of
don Pharmacopœia,' which was misled by Willden
Heracleum gummiferum, Willd., an error corre
subsequent one, where it is correctly referred to t
ammoniacum (Don, in 'Linnean Trans.,' vol. x
which was discovered by Lieut.-Col. Wright, gr
Yezd Khāst, a town of Īrāk Ajemi, the antient P
42 miles south of Ispahan. Its Persian names are
Ooshook. It has more recently been found on th
near Herat, likewise abundantly in Syghan, near B
the north-west slope of the Hindu-Coosh range of
(Christison.)

Ammoniacum was known to the antients: but it
that what they used came from Africa as well as
was procured from a species of Ferula, either the F
(Linn.) or the F. tingitana (Linn.).

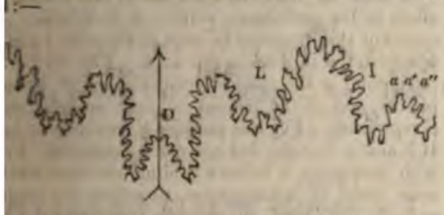
The Persian plant yields the juice chiefly from
especially the points of divarication of the umbels
the punctures of numerous coleopterous insects. '
so abundant, that upon the slightest puncture bein
instantly oozes forth, even at the ends of the leaves
Hart, *Trans. of Medical Society of Calcutta*, vol.
The juice quickly dries, and is either picked off or
accumulate till it falls on the ground. This colle
place about the middle of June. A tenth part is
tribute to the government; the rest is sent to Bush
Persian Gulf, and thence to Europe. The best
Bombay. The juice of the Syghan plant is obtain
ing successive slices of the root, as in the case of
The samples vary much in quality. The direction
purify the inferior sorts, by softening them in boil
and squeezing them through a cloth, though capa
moving mechanical impurities, impair the power of
resin, by driving off the volatile oil, which eve
specimens is not very abundant, 32 ounces yielding
lation only one drachm.

The officinal form for administering ammonia

which It is partially dissolved and partially sus-
water. It is a most valuable expectorant, and may
rtues increased by the addition of squills or ipecacu-
lute nitric acid greatly heightens its powers. It is
gredient in the compound squill pills. Externally it
as a plaster, to disperse indolent swellings, either
by vinegar, a form which has kept its place amid all
ges in medical agents for nearly two thousand years,
ned with mercury, which is often beneficial.

IONITES, a fossil genus of Cephalopodous Mollusca,
the recent genus Nautilus. [CORNU AMMONIS, P. C.;
tes, P.C.; POLYTHALAMACEA, P. C.] In the opinion
uralists this great group of fossils requires to be sub-
. The Goniatites of the Palæozoic rocks have been
lly separated, the Ceratites of the triassic strata may
withdrawn, but still the number of genuine ammonites
mains is so enormous to be treated except in sections
r be divided on structural affinities. Without dis-
what may be the best principles for such a classifica-
t may refer to that of Von Buch, as most generally
by geologists. This is mainly founded on a con-
of the sutures, or sinuous lines at the surface of the
ed by the edges of the diaphragmal plates which
e chambers. (The forms of the mouth are gra-
ming known to us, and these may hereafter become
ications of natural affinity.) The following are
groups, with their prevalent geological distribu-

The back is usually broad, and carinated (often
each side of the keel); the ribs are simple
The sutural line formed upon the following
:—



of Arietes, including Amm. Bucklandi, A. Co-
belongs almost wholly to the lias formation.
-The back is narrow, and acuminated to a sharp
w on its sides); the ribs are elegantly and sig-
. The sutures differ from those of the Arietes,
D being much less deep, with diverging and
es; the sinus L is very much deeper, and there
ur smaller ones, $a\ a'\ a''$, near the inner edge of
The latter whorls usually embrace the preceding

onites are numerous in the upper lias and lower
ions. A. Strangwaysii of Sowerby is an ex-
mmonites Walcottii does not belong to this di-

-The back is generally acute and keeled, the
crenated; the ribs generally a little sigmoidal;
rls embracing the preceding ones. The sutures
form much like those of the last division, but
ciniated and foliaceous.
belongs to the upper lias and oolitic formations.
naltheus of Schlottheim (A. Stokesii, Sowerby)
from the lias.
—The back broad, without a keel. The ribs
t, strong, and crossing the back. Inner whorls
e sutures often approach to those of the Arietes
he sinus D; but the posterior edge of D, L, and
same line, and the undulations are all lower
ous than in the Falciferi and Amalthei. Am-
ostatus (Sowerby) is an example. The species
the lias.
-The back and sides rounded; no keel; the
exposed. The ribs are often divided over the
The sutures are remarkably laciniated and
the sinus (L) extremely deep, and generally

occur commonly in the lias and oolitic forma-
nites communis, Sowerby, is an example from
licatilis, Sow., from the coralline oolite.
The back is broad and not keeled; the whorls
: the ribs are simple on the sides, but divided
and generally bear a tubercle at the point of divi-
tes Davœi, Sowerby, is an example from the lias.

Coronarii.—The back without a keel, usually broader than the sides; the ribs are straight and simple on the sides, but divided into two, three, or more as they cross the back, and the point of division is usually sharply tuberculate. The sutures resemble those of the Planulati. The species occur in the oolites, as A. Humphresianus, Sow.; A. Gowerianus, Sow.; and in the lias, as A. Bechei, Sow.

Macrocephali.—The back is without keel, and round and broad, and the umbilicus deep. The ribs are straight on the umbilical face and simple, but sometimes arched, and generally divided across the back. The sutures resemble those of the Planulati, but are somewhat differently proportioned to the dorsal and umbilical surfaces. The species occur in oolite and chalk. The Ammonites sublævis, Sow., is a good example, from the Kelloways rock.

Armati.—The back without a keel, often broader than the sides; ribs tuberculated on the sides. The inner whorls exposed. The sutures have the dorsal sinus (D) large and deep, the lateral sinus (L) widely removed from it and very deep, and somewhat trifurcate. Occurs in the lias and oolite, and more plentifully in the chalk. Ammonites Bakeriæ of Sowerby is an example.

Ornati.—The back flat or even hollow, narrow, and not keeled; the broad sides joining it at a right angle, marked in general by a row of small tubercles or the numerous fine ribs which cross the back and toward the inner edge unite in parcels to form acute or knotted ridges. (The old shells are often plain.) The sutures have the dorsal sinus (D) shallow, the lateral (L) deep. The species are almost confined to the Oxford clay and Kelloways rock. As Ammon. Calloviensis, Sow.; A. Duncani, Sow.; A. gemmatus, Phil., &c. (Von Buch rightly separated from these the *Dentati* in his original memoir, though they have been injudiciously reunited again.)

Dentati.—To this group we refer Ammonites splendens, Ammonites lautus, Ammonites dentatus, &c. of the golt. The back is flat or concave, and margined by tubercles, or prominent ends of strong ribs, often united near the inner edge into tuberculated ridges, but not crossing the back. The sutures resemble in general form the preceding.

Flexuosi.—The back narrow, with borders tuberculated or serrated by the terminations of the ribs, and in a young state with a tuberculated keel. The ribs are ridged or tubercled near the inner edge. This group is quoted from the upper oolitic and chalk formations, and A. asper and A. flexuosus are examples.

The classification above sketched is very far from perfect. It is difficult to define the groups, when we pass from the typical to the ordinary species, and there are many forms which refuse to be included in the formulæ. Still it is an admirable sketch, and when the Ammonitidæ are fully developed, according to the principles thus exemplified by Von Buch, we shall have them recognised, not as a genus with subdivisions, but as a family including many genera. There are admirable remarks on the Ammonites in D'Orbigny's 'Palæontologie Française,' and a very instructive examination of their structure by this writer in the 'Annales des Sci. Nat.' (1841) N.S., xvi. p. 113, which also contains Von Buch's papers (1829) xvii. 267; xviii. 417; xxix. 5.

AMO'MUM—*Medical Properties of this and allied Genera.* This comprehensive heading is adopted to include many aromatic stimulants, such as cardamoms, grains of paradise, &c., which are obtained from several plants related to amomum. German pharmacopolists even term Pimento berries, or Jamaica allspice, *semen amomi*, but this is never so called in Great Britain. Much obscurity hung over the history of the true cardamoms, which recent investigations have removed; and as Dr. Pereira has treated the whole subject at great length in his 'Materia Medica,' his statements are chiefly followed here.

The true, officinal, or Malabar cardamoms, are procured from the Elettaria Cardamomum (Rheede, 'Hortus Malabaricus,' vol. ix.), White; the botanical characters of which were described by Dr. Maton ('Trans. Linn. Soc.' x. p. 254). The Edinburgh College term it Renealmia (Rosc.); the London, Alpinia Cardamomum (Roxb.). It occurs in the mountainous parts of Malabar, and is also cultivated. The cardamoms of the Wynaad, which are the most esteemed, and bring the highest price, are cultivated. The fruit is the part collected, but the seed alone is used. The seed-vessel or husk is altogether devoid of aroma or pungency, but the seeds should never be taken out of it till required for use, as they keep much better in their natural envelope: 100 parts of best cardamoms yield 74 parts of seed and 26 of husks. This kind of cardamoms, called the small or lesser, presents three varieties in commerce, viz. shorts, short-longs, and long-longs, placed in the order of their merit. The first and best are about three to six lines long; the second about six; the last from seven lines to an inch. Trommsdorf analyzed the small cardamoms, and obtained—essential oil, 4·6; fixed oil, 10·4; a salt (probably malate) of potash, combined with colouring-matter, 2·5; fecula, 3·0; nitrogenous mucilage, with phosphate of lime, 1·8; yellow colouring-matter, 0·4; and woody fibre, 77·3.

The fixed oil somewhat resembles castor oil. The excellence of the specimen depends on the volatile oil; this is small in inferior kinds; the best yield about six drachms and a half for every pound of the fruit. Jamaica cardamoms yield only four scruples for one pound of fruit. Like oil of turpentine, lemon, &c., it consists only of carbon and hydrogen.

Ceylon cardamoms, or larger, sometimes termed long, are produced in that island; but some of the less valuable of the Malabar fruits are termed Ceylon cardamoms. The name of 'grains of paradise' is sometimes given to this plant. It strictly belongs to an African plant, Amomum Grana-Paradisi (Smith), A. Meleguetta (Roscoe). Grains of paradise are used to sharpen vinegar, beer, liquors, &c., and brewers who have them in their possession are liable to heavy penalties. [Adulteration, P. C. S.] The duty on grains of paradise was reduced from 2*s.* per lb. to 15*s.* per cwt. by 5 & 6 Vict. c. 47.

Cardamoms are in great favour in the East as a spice, and also as an aromatic stimulant in the treatment of disease. In Europe they are as highly esteemed as carminative and stomachic agents. Dr. Christison observes that they form part of eighteen officinal preparations, besides their own tinctures.

AMONTONS, GUILLAUME, a diligent mechanician and experimenter in natural philosophy, was born at Paris in August, 1663. He was, during all his life, afflicted with deafness in consequence of a fever in his childhood; and, after a sickness which lasted but a few days, he died in October, 1705, being in the forty-third year of his age.

The taste of Amontons led him, at first, to the study of architecture and the processes of land surveying, and he appears to have been occasionally employed in the practice of both those branches of art. It is said that he was induced to apply himself to the study of mathematics by the desire of constructing a machine which should exhibit a perpetual motion: an opinion of the possibility of such a machine certainly lingered among the half-learned of that age; and, if Amontons really attempted to form one, his failure had the good effect of disposing him to cultivate the legitimate branches of science.

At that time the instruments employed for measuring the density, temperature, and humidity of the atmosphere were in an imperfect state; and several years of the life of Amontons were spent in improving them or in devising others. He invented a barometer, consisting of a slender conical tube of glass containing a column of mercury whose length varied by the variations in the upward pressure of the atmosphere on the base of the column; the open end of the tube, which was the greatest, being below, and the mercury being retained in the tube by a leathern bag. He also invented one, consisting of a tube bent so as to form three parallel columns, of which the first and the third contained mercury, and the intermediate one only air. Amontons contrived what he called a 'universal thermometer:' it was a tube of glass, 30 inches long, containing mercury, and to which was adapted a scale of inches; and, by comparing its indications with those of a column of mercury in an ordinary barometer, he was able to determine the expansion due to temperature alone: he also invented a species of hygrometer, consisting of a coloured fluid contained in a glass tube which terminated below in a leathern bag. The contraction or expansion of this bag, in consequence of variations in the humidity of the air, produced corresponding variations in the length of the columnof fluid.

But the most remarkable circumstance in the life of Amontons is his invention of what must be considered as a species of telegraph. His proposal was to have signal-posts established at intervals between the two extreme stations, which were to be Paris and Rome: a man at each post, being provided with a telescope, was to observe the signal (a letter of the alphabet) made at one station, and to repeat it to the next; the process being carried on thus along the whole line. Two experiments are said to have been made by him in 1702, in presence of the royal family of France, but it is not said with what success. Dr. Hooke had however anticipated the discovery about 18 years.

The only work which Amontons published 'Remarques et Expériences physiques sur l d'une nouvelle Clepsydre, sur les Baromètres, et Hygromètres,' Paris, 1695. He was, subse publication of this work, chosen a member of the Sciences; and among the 'Mémoires' of that bo Amontons on the expansion of fluids by heat, o strength of men and animals, and on the friction (*Biographie Universelle; Eloge d'Amonto* tenelle.)

AMPE'RE, ANDRE' MARIE, was one scientific men who, since the commencement century, have distinguished themselves by th the highest branches of mathematical analys propositions, and particularly to such as relat magnetism, and light.

Of his private life little is known; and his h of most of the men who have passed their d pursuits, consists merely in statements of his with a list of the works which he composed. at Lyon, in 1775, and it appears that he resid that city till about the year 1804, when he rem where he died in 1836. Before this removal he of physics in the central school of the depart and, subsequently, he held the appointment o analysis in the Polytechnic School of Paris.

His first publication is entitled 'Considerations mathématique du Jeu' (Lyon, 1802), in which torily proved that, if a person play habitually i must infallibly, even though he play on equal ter since he is, as it were, playing with finite mea opponent who may be considered as infinitely r therefore may continue the game indefinitel Ampère presented to the Class of Physical and Sciences of the National Institute a paper cherches sur l'Application des Formules généra des Variations aux Problemes de Mécanique; 'Annales de Chimie' (1814) there is published Berthollet on the subject of Definite Propo Atomic Theory.

Some connection between the electric, galvanic, powers in nature had been long suspected on a observed effects of lightning on the directive prop netized needle; and in 1819 M. Oersted observe connecting the opposite poles of a galvanic or v caused a magnetized needle suspended near it t that position which it assumes when beyond t any disturbing power. This remarkable phen made public, the philosophers both of this coun continent repeated the experiment in variou almost immediately, by the discoveries to which t led, raised up a new branch of science. Amo of these philosophers was Ampère, who, in Sep read before the Académie Royale des Scienc which it was stated that the voltaic pile, or ga itself, produced a like effect on a needle susp when its opposite poles are connected by a w afterwards he communicated an important dis proved that some, at least, of the phenomena could be represented by electricity alone. H if two wires connect the opposite poles of a attract one another when so disposed that the along them in the same direction, and repel when the currents flow in contrary directions; trived a delicate apparatus by which the ph exhibited.

Faraday having discovered that if a wire be su one pole of a magnet, and the galvanic fluid be along the wire, or if the wire be fixed and the pended over it; the wire in one case, and the other, would revolve about the fixed object; Amp the discovery was communicated, immediately re periment, and subsequently contrived an apparat suspended magnet was, by the influence of the revolve on its own axis. He also invented the apparatus, consisting of a copper cylinder surro zinc, and containing diluted sulphuric acid, b cylinders being supported by conical points over magnet placed in a vertical position, revolve about from right to left if the north end be upperm contrary direction if the south end be uppermost. afterwards, in conjunction with or at the Ampère, succeeded in communicating magnetis

ithin a helix of copper wire, the extremities of
nnected with the poles of a battery.
utual attractions and repulsions existing, appa-
rical, or, as they may be called, electro-magnetic
pere inferred that such currents revolve con-
a magnet; at first he supposed that the centres
olutions were in the axis of the magnet, but he
ntly led to consider that currents revolve about
planes a little inclined to the general axis of the
ting out with this principle, he satisfactorily
analytical processes, the phenomena of electro-
r, as he designated the science, electro-dynamics.
d moreover that the magnetic action of the earth
of currents circulating within it, or at its surface,
west in planes parallel to the magnetic equator:
ined that these currents act on balanced or sus-
ies which, like magnetized needles, contain electric
ing them to place themselves in such positions
ents on their under sides may flow in the same
those of the earth. He contrived several inge-
es in which terrestrial magnetism was an agent:
s, he disposed a wire bent in the form of a
a spiral, so that the plane might turn on a vertical
acing it in the position of the magnetic meridian,
he electric current to enter at either extremity,
y as a magnetized needle would do, it turned till
right angles to that meridian. He also exhibited
Academy of Sciences a copper wire bent in the
x which possessed the properties of a magnet;
mities of the wire returned along the axis of the
y, to the middle, from whence they passed out
rections and served as pivots on which the spiral
When the pivots were connected with the poles
ach end of the helix, on a pole of a common
presented to it, was attracted or repelled.
blished at Paris, in 1822, a work entitled
servations Electro-Dynamiques;' in 1824, one
signated 'Précis de la Théorie des Phénomènes
miques' (both of these are in 8vo.); and in 1826,
rie des Phénomènes Electro-Dynamiques.' Two
rds he published a 'Mémoire sur la Détermi-
Surface courbe des Ondes lumineuses, &c.;' and
bsequently an 'Essai sur la Philosophie des
.' Besides these works there were published
veral memoirs relating to his experiments in
ics: also, in the 'Mémoires de l'Institut,' in
de l'Ecole Polytechnique,' and in other works,
rs relating to Mechanics, Optics, and Natural

of *H. R. H. the Duke of Sussex to the Royal*
London, 1836; Barlow's *Essay on Magnetic*
Turner's *Elements of Chemistry*.)

ISTUS, a fossil fish, from the Isle of Sheppy.
. *Fossil*.)

ETUS, a genus of Echinidæ, found in the
k.

N (Pander), a genus of fossil Crustacea (Tri-
species of which have been described, from
Waterford, by Captain Portlock.

XUS. [Branchiostomata, P. C. S.]

HERIUM (Blainville). This fossil mammal,
ld, is now termed Thylacotherium by Owen.

US (Sowerby), a fossil genus of Madrephyl-
emarkable for the simplicity of its structure and
of its general figure. Occurs in the mountain
Devonian limestone.

Dalman), a genus of fossil Crustacea (Trilo-
cies of which have been described by Captain
Tyrone.

LUS—*Medical Properties of*. *Amygdalus*
e native of Asia and Africa, cultivated in the
of Europe, of which there are two varieties,
r. Of the sweet almonds the parts which are
seeds or kernels. When covered with the
of a clove-brown colour, smooth, with vessels
skin, and forming a raphe. Deprived of the
haped seed, formed of two cotyledons, is seen
our. They have a sweet and mucilaginous,
e, and scarcely any odour when fresh, but
disagreeable rancid taste.

Boullay, they yielded emulsin, and a fat oil
kind. Ten pounds of seeds yield four pounds
ing subjected to pressure, or treated by means

of æther, the oil is separated, and there remains the cake, or farina amygdalae. The commercial varieties are numerous, but the most esteemed are the Jordan almonds.

Triturated with water, sweet almonds form a grateful, sweetish emulsion, which possesses considerable nutritious as well as demulcent properties. This emulsion should never be prepared long before it is required for use; as, besides the certainty of spoiling, there is the risk, when bitter almonds are employed, of some of the poisonous products being developed. Almond paste forms a good emollient application to chapped hands in winter.

Almonds, as an article of dessert, are nutritive, but rather indigestible. In some persons they occasion, more particularly bitter almonds, an eruption similar to nettle-rash, and other troublesome symptoms.

Oil of Almonds.—The almonds having been freed from the skins must be bruised, and pressed in cold, or, if warmed, they must be pressed in iron presses. The oil when first obtained is turbid, but becomes pure by time or by filtration. It is yellowish, or nearly white, if the almonds have been completely freed from the skins before being pressed, translucent, and when cold-drawn is without odour. The taste is purely oily. Specific gravity, 0·911 to 0·920. Consists of, elain 75; stearin 25. It is tolerably fluid at the ordinary temperature of the air, but by reduction of temperature becomes turbid and white, and by a still further reduction is rendered solid. Alcohol when cold takes up 1-25th part. Sulphuric æther and the volatile oils combine with it in every proportion. Caustic potass forms with it a very solid soap. When it has been carefully expressed, it does not become rancid so easily as is believed.

It may be obtained from either variety, but is yielded in greatest abundance by the bitter almond. Ten lbs. of sweet, when cold-drawn, yield from 4 to 4½ lbs.; 16 lbs. of bitter almonds yield 7 lbs.

Almonds which have become rancid yet yield by expression good oil, if a little calcined magnesia be added to the bruised almonds before being subjected to pressure.

Almond oil is often adulterated with poppy oil. It is employed more as an external application, especially to the ears, than internally.

Amygdal. Amaræ, bitter almonds, are smaller and flatter than the sweet. Those most esteemed come from Provence, those least esteemed from Barbary. They have a very bitter taste, and scarcely any odour, but if rubbed between the fingers with a little water, they emit a peculiarly agreeable odour. Triturated with water they form an emulsion, which by distillation yields a volatile oil, containing hydrocyanic acid. This oil is procured in very variable quantity; one pound of almonds yielding in some instances one drachm, in others only fifty grains, in others only ten grains.

A fat or fixed oil is also contained, which may be procured by expression. Hence in the Pharmacopœia, Oleum Amygdalarum is directed to be expressed from the kernels of either variety. For the sake of economy this fixed oil is first procured, and the cake which remains is employed either to yield the volatile oil containing hydrocyanic acid, or to furnish Amygdalin.

Amygdalin is a peculiar product, containing nitrogen. It does not possess the poisonous properties of hydrocyanic acid, yet it is one basis of that powerful agent, and some account of it is necessary to understand the manner in which bitter almonds occasion a poisonous action. It is procured as follows:—the cake remaining after the fixed oil has been expressed is to be treated with boiling highly rectified spirit, containing not less than 80 per cent. of alcohol, so long as anything is taken up by the spirit. The spirit is then to be distilled off, the residuum dissolved in water, then filtered and crystallized. The crystals are to be purified by repeated crystallization. They are either in the form of small colourless shining prisms, or micaceous plates, devoid of odour, having at first a sweetish taste, but afterwards extremely bitter. They are not volatile, but are easily soluble in water, without undergoing the slightest alteration; less soluble in alcohol, and not soluble in æther. Geiger thinks this principle worthy the attention of medical practitioners.

It is this substance which, when acted on by the emulsin, and water, forms both the hydrocyanic acid and the *volatile* oil of bitter almonds. The former will be amply treated of in P. C. S. [Hydrocyanic Acid.] The latter requires to be known to the public as an agent not inferior in power to prussic acid. Its specific gravity is greater than that of water. It is soluble in alcohol and æther. It is a compound of a very complex kind, containing hydrocyanic acid, hydruret of benzule, benzoic acid, benzoine, benzamide, &c. (Pereira.)

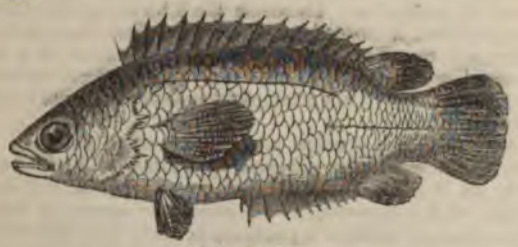
It is sold in different degrees of dilution to cooks, confectioners, and others, to flavour cakes and liqueurs, under the name of essence of ratafia, peach-essence, &c. (See *Lancet*, June 8, 1844, and *The Chemist*, vol. v. p. 335.) From its indiscriminate use, as well as variable strength, many fatal cases result from it. It is also used as a criminal means of destroying life.

A'NABAS (from ἀναβαίνω, to ascend), the name given by Cuvier to a genus of Acanthopterygious Osseous fishes, remarkable for the power possessed by the species of living for some time out of water and making their way on land. This power depends on a structure characteristic of the family of which it is the type, part of the pharangeals being labyrinthiform, that is to say, divided into a number of irregular lamellae, more or less numerous, forming cavities and little cells capable of retaining a certain quantity of water. This apparatus is so protected, that when the animals are out of their native element the evaporation of the contained water takes place very slowly, and the gills are kept moist, by means of which remarkable provision the fishes of this family are enabled to leave the rivers and marshes where they usually reside, and to travel over land for considerable distances, creeping among the herbage or along the ground. Although this fact has been but recently known to modern naturalists, the antients appear to have been well acquainted with it, and Theophrastus has recorded the existence in India of certain little fishes which leave the rivers for a time and again return to them: he doubtless alludes to the Anabas and its allies.

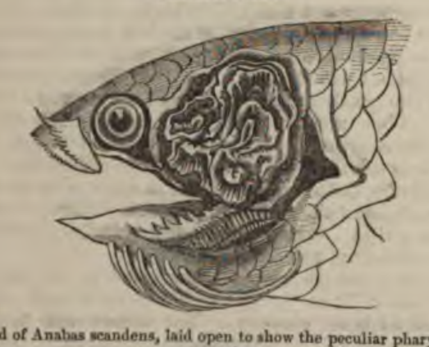
The genus *Anabas*, of which there is but one species, the *Anabas scandens* (Perca scandens of Daldorf, Anthias testudineus of Bloch), is distinguished by a well-marked character, the borders of its opercle, subopercle, and interopercle being denticulated, whilst the preopercle is not so, nor even distinctly marginated. The head is round and broad; the muzzle is very short and obtuse, the eye placed very near its extremity. The mouth is small, and large scales cover the head. The body is oblong, compressed centrally and behind. The lateral line is interrupted at its posterior third, recommencing a little lower. The tail is somewhat rounded. The whole body is covered with large scales. There is a single dorsal and an anal fin, nearly equal in height, and in both the spinous rays prevail. The formula of the fin-rays in the *Anabas scandens* is as follows:—

D. 17 or 16-9: A. 10 or 11-10: C. 16: P. 15: V. 1-5.

In colour it appears to vary, being brown or bluish-black or dark green, paler beneath and having violet fins. In form the individuals are constant, and reach the length of six inches.



Anabas scandens.



Head of Anabas scandens, laid open to show the peculiar pharyngeal apparatus.

This fish inhabits all parts of India and the Indian archipelago, living in marshes and feeding on aquatic insects, and Dr. Cantor has recently observed it at Chusan. Respecting its habits there has been much discussion. In 1797 a Danish gentleman, M. Daldorf, account of its habits to the Linnean Soci which he stated that he had observed it in ing palm-trees near marshes, and had taken no less than five feet above the surface of t its movements of ascent by means of its fins spines of its opercles, in a similar manner to progressed along the ground. Another M. John, published a similar statement, called in Tranquebar *pannei-eri*, a name *tree-climber*. Other naturalists, who have it in its native countries, such as Reinwardt, Hamilton Buchanan, whilst they record its on the ground and living a long time out omit all mention of its power to ascend trees

To the same family with *Anabas* be *Helostoma*, *Polyacanthus*, *Colisa*, *Macropod* *Trichopus*, and *Spirobranchus*, of which yet very imperfectly known, though the pec anatomy warrant us in supposing that the power of living out of water.

(*Linnean Transactions*, vol. iii.; and C ciennes, *Hist. Nat. des Poissons*, tom. vii.)

ANABATHRA, a fossil tree, from wickshire, is thus named by Mr. Witham *Foss. Veg.* t. 8 and t. 10.

A'NABLEPS (from ἀναϐλέπω, to look Malacopterygious Osseous fishes, remarkabl structure of their eyes, which, in consequenc of the iris and cornea by transverse ligamen pils, and appear as if double, whilst there is line humour, one vitreous humour, and one no other example known of such a modific among the Vertebrata. This peculiarity of given rise to several stories of four-eyed fish, accounts of their habits. The *Anableps te* habits the rivers of Guiana and Surinam. drical, and covered with strong scales; its and snout blunt. The upper jaw projects b Its anatomy has been made the subject of a pède, which is published in the second vo *moires de l'Institut*.

ANAMORPHO'SIS (ἀναμόρφωσις, change of form) is such a representation o except when viewed from a particular poin cylindrical mirror, or through a polyhedral l to be distorted, or disconnected, or to be a v very different from the original object. Suc are only made for the amusement of young p fore a very brief explanation of them may s of forming them has been treated at length turgus Opticus' of Niceron, and in the 'Pe of Maignan.

Distorted figures which are to appear, whe from a given point, in the just proportions w an original drawing or print, may be easily lowing manner:—The original figure bein net-work of squares within a square drawn upon any convenient part of a sheet of pape drawn equal in length to the base of the circu and divided into a like number of equal pa point taken at pleasure vertically under the the eye, lines are to be drawn of indefinite le points of division, to represent those which, have been drawn perpendicularly to the bas Let next a line be drawn from the assumed s the paper, parallel to that which was made eq line, and let it be made equal in length to th the eye above the paper: then, if a line b extremity of this line through one end of till it meets the line drawn from the seat of the opposite end of the same line, its intersec lines which represent the perpendiculars will which lines being drawn parallel to the di lines will represent the corresponding line original parallel to the base of the circumscri within the trapezoidal areas thus formed, original figure which fall in the correspon drawn, the figure thus traced will be the required; and, when viewed from the assun eye, it will evidently appear exactly as, to a point, the original would appear if it were p position with the base of the square on th represent it; that is, it will appear to be an exact he original.

rted representation of some object, which is to appear n being viewed from a given point, and by reflexion cylindrical mirror whose curvature and position are n, may also be drawn on a plane by means of a per- representation, as already described, of the squares ithin a square circumscribing the original print or The base of this square must be equal to a chord of rical mirror; and from the centre of the mirror's n paper, lines must be drawn through the points n the chord to meet the circular arc representing the cylinder; then from the points of meeting s are to be drawn, making, with the radii, angles which are made with them by lines drawn to the arc from the seat of the eye; and on them , from the points in the arc, distances equal to same points from the several lines which, in the pezoid before described, represent the horizontal over the original figure. Lastly, curve lines, early arcs of concentric circles, being drawn points thus found, there will be formed a net- ed-lined trapezoids, within which the parts of the ure are to be traced so as to correspond to those squares first drawn. This distorted tracing being ntally on a table, and the mirror being set up ver- the arc which represents its base, the reflected , to the eye, appear exactly similar to the original

d figures, which are to be seen corrected when rough a polyhedral lens or multiplying glass, a lens ne surface is a plane, and the other is constituted ber of planes having for example the figures of may be traced mechanically thus:—Let the multi- o be placed in a tube, like the eye-piece of a tele- distance from the end to which the eye is to be ther greater than the focal length of the glass, and mall aperture be formed in the cover at that end: lacing a lamp or candle before the aperture, the t passing through the faces of the lens will project, n placed perpendicularly to its axis, at any conve- ce beyond the focus, a number of luminous spaces ng to the several faces of the lens, with intervals hem. In these luminous spaces, whose outlines traced with pencil before the light is removed, be drawn by hand parts of a landscape or figure, so ing through the aperture, they shall seem to form sentation of the intended object.

ces thus drawn, when viewed in any manner ugh the aperture, will be unconnected; and the ay be filled up with any objects at pleasure, so that ay appear confused, or may represent something om the original landscape or figure: then, on ough the aperture, towards the screen, the inter- mentioned, and the objects drawn on them, will be nd there will appear only the representation of the ed by the junction of the parts within the outlines that is, a correct copy of the original object.

RPHO'SIS. (Botany.) [Metamorphosis, P.C.]

HYTES (Lamarck), a fossil genus of Echino- nd in the chalk formations abundantly.

HICAS, a genus of Acanthopterygious Osseous ished by Linnæus, and retained by subsequent s. They are very nearly allied to the Blennies, r remarked they might be regarded as Blennies al fins. They have round, smooth, blunt heads; dies, covered by minute scales; a single long extended anal fin, both separated from the cau- als; the mouth armed with formidable teeth of nical incisors and flat grinders. One species, the cat, or cat-fish, Anarrhicas lupus of Linnæus, is e northern seas, and in Britain is frequently taken ast of Scotland and the Orkneys, though rare on ores. Its range extends to Greenland. It grows of six feet, and is a ferocious and formidable ying the nets of fishermen; when caught it to its last gasp, inflicting severe wounds by owerful teeth and jaws. It lives chiefly on crus- ceous mollusca, and, like most fish which subsist its flesh is excellent eating, though, from the ce of the animal, usually rejected. It finds its to the Edinburgh market, where, by naturalists ose knowledge of its good qualities enables them to vanquish their prejudices against its aspect, it is much esteemed. The cat-fish is of a light grey colour marked with seven or eight broad vertical bands of bluish grey. When old it becomes darker. Its skin is covered with slime. The formula of its fin-rays is—D. 74: P. 20: A. 45: C. 16. For figures of this fish see Yarrell's *British Fishes*, vol. i.; Pennant; and Bloch.

ANATO'LIA. Since the publication of the first volume of the P. C. the interior of this country has been explored, in nearly all directions, by travellers who were protected and aided by firmans of the sultan. The present article proposes to give a succinct account of the geographical results of their researches. A complete map of the country, uniting the requisites of completeness and correctness, has not yet been published: the map drawn by Arrowsmith for Hamilton's 'Researches' is the best we have, though it is only fragmentary. The charts of the Russian Survey of the coast of the Black Sea, published in 1840 and following years, are not surpassed by any other. The survey of the western coast has been completed under the superintendence of Captain Graves, but the charts are yet unpublished; this survey, with that of Captain Beaufort of the southern coast, complete the survey of the Mediterranean coast of Asia Minor. The part of Captain Graves's survey comprehending the Gulf of Syme and the adjacent coast was first published in Arrowsmith's map, which accompanies the 'Researches' of Hamilton. The former maps of this part of the coast were very erroneous. The coast of Lycia has been known since the survey of Captain Beaufort, but the interior was first visited and described by Fellows.

Orography.—1. *Mount Taurus.*—The Euphrates from the junction of the Kará-Sú with the Mürád-Chái, near Kápán-Máden, runs in a south-western direction till, in 38° 36′ N. lat. and in 38° 30′ E. long., it enters an Alpine country through the narrow pass of Ilíjah. Stopped by a range of lofty mountains, the river turns east, south-east, south, and south-west, and after having made a curve, the diameter of which from north to south is above 70 miles, resumes its southern course in the environs of the village of Búser. The tract encompassed by this curve of the Euphrates is a mountain-knot, which may be considered as the eastern beginning of Mount Taurus; its northern limit is formed by the river Tókhmah-Sú, the Melas of the antients, which joins the Euphrates on the west a little below the pass of Ilíjah. This knot, of which the Aghjah or Akjah-Dágh is the highest point, stretches west as far as the town of Merásh, whence it continues in several ranges; and for the sake of convenience we shall call the whole the Akjah mountains, though it would be perhaps as well to call it the Commagenian mountains, since the country thus encompassed by the Euphrates was the principal part of the antient province of Commagene. Well wooded and fertile valleys lead from the Tókhmah-Sú up to the mountains. They wind at first through limestone hills abounding with fossil shells. Where the hills end, long ridges of black volcanic rocks begin; these are succeeded by platforms and tablelands, upon which rock-terraces rise one above another, terminated at the crest in conical summits. On the Belli-Gedik hills Ainsworth found the altitude by the barometer to be 5625 feet, but the Akjah-Dágh is probably twice that height, it having been seen covered with snow in the latter part of May. Other peaks are the Ak-Dágh, as high as or higher than the Akjah-Dágh, the Pelvereh-Dágh, the Tójik-Dágh, and many more, some of which are probably covered with eternal snow. The Gök-Sú, a small river which joins the Euphrates after a southern course, winds through colossal cliffs of limestone, and forms the celebrated pass of Erkenek, the most difficult part of which lies in the valley of the rivulet Erkenek, which joins the Gök-Sú. The antient town of Perre, now probably Pelvereh, was situated in the pass, the only one through which armies coming from the interior of Asia Minor can descend into the valley of the Euphrates, and thence into Mesopotamia or Syria. In this part of the Akjah mountains the rocks consist chiefly of shaly schists, which constitute the axis of the whole Taurus. The valleys are well cultivated and inhabited by Kurds. Near Marásh a chain separates from the principal knot, forks into two branches, and encompasses the Gulf of Iskénderún; the southern branch, formerly Mount Amanus, stretches into Syria, at a short distance from and in a parallel direction with the coast, and at a few miles south of the town of Iskenderún it is intersected by a narrow defile which begins at the village of Beilán, and through which runs the high-road from this corner of Cilicia to Antioch and the other parts of Syria. The defile of Beilán is the southernmost part of a series of long narrow passes between the sea and the steep rocks of Mount Amanus: it begins near Báyás, thence runs to Iskénderún, where it seems to lose the characteristic features of a mountain defile, and thence runs up to Beilán, where it re-assumes its original character. North of Báyás the defile ceases where the plain of Issus begins; the road crosses this plain, and after having turned round the innermost corner of the Gulf of Iskénderún, enters another defile in the chain of Dúrdún-Dágh, the northern part of Mount Amanus. The whole of these passes were called by the antients the Syrian gates (Pylae Syriae), which are renowned in the history of military warfare from Alexander and Darius down to the present time. The narrowest part of the pass across the Dúrdún-Dágh is shut up by an antient stone-wall built of polygonal masses of basalt, without cement, with an archway through which the road goes, and which has the Turkish name of Demir-Kapú, or the iron-gate. Ainsworth, who has written a memoir on the subject, identifies this old fortification with the Amanian gates (Pylae Amanides) of the antients. The river Jíhún, the antient Pyramus, runs along the northern and western slopes of the range of Dúrdún-Dágh.

The principal chain of the Taurus stretches from the environs of Merásh in a western direction across the whole length of the peninsula, and is generally but not always parallel with the coast. We add a few particulars to its description in the P. C. In about 35° E. long. the chain is called Búlghár-Dágh, a very lofty range, through which the Sihún, the antient Sarus, passes in a bed overhung on both sides by steep rocks 1000 feet high, which form the celebrated pass of Gólek-Bógház, known to the Romans as the Portae Ciliciae. During the time that Syria and the pashalik of A'dána belonged to Mehmed 'Ali, pasha of Egypt, the Gólek-Bógház was partly in possession of the Turks, and partly of the Egyptians, both of whom had erected strong fortifications for the defence of their respective portions. The narrow tract between the Búlghár-Dágh and the coast has an alpine character, and under the meridian of Mezetli, the antient Pompeiopolis, the principal chain of the mountains approaches the coast so closely as to become visible from the sea in all its outlines. The whole country round the Gulf of Iskénderún is thus surrounded on one side by the sea, and on the others by lofty mountains, which, being traversed by a few long and narrow defiles, may be successfully defended by a handful of men against the most numerous armies. The tract abounds in fruit, wine, corn, timber, and other productions, and is watered by two navigable rivers, the Jíhún and the Síhún, and many streams of less importance, among which the Tersús-Cháí (river of Tarsus), the antient Cydnus, is the chief. This part of Cilicia was once a most flourishing province, and there are few countries of its extent to which so many historical recollections are attached: the towns of Tarsus and Mopsuestia, the cold waters of the Cydnus which endangered the life of Alexander and killed the Emperor Frederick I., and the Plain of Issus, where Alexander defeated Darius. If any power that is master of the sea should have an interest in making a firm footing on the continent of Asia Minor, with the view of either preventing its conquest by an enemy of Turkey, or having its share in the dismemberment of the Ottoman empire, that power would most certainly plant its standard on the Plain of Issus.

On following the Taurus in its western direction, we find the Kará-Dágh and the Allah-Dágh, two lofty peaks which are situated only a little distance from each other, and north of the great chain, in the southern corner of the antient Lycaonia. The name of the Taurus is here Ichílí-Dágh, as Mr. Hamilton states. The Kará-Dágh, an insulated trachytic cone, rises above a sandy plain, and is of barren and dreary appearance; a low ridge stretches from it north-east in the direction of Hasán-Dágh and Mount Argaeus, with which it appears to be connected, forming part of the same system of elevation, and standing consequently on the edge of the great table-land of which we shall speak hereafter. The Allah-Dágh stands on a base of thin-bedded semi-crystalline limestone, dipping south-east, and is connected with the chain of the Taurus, which here chiefly consists of Jura limestone. The Allah-Dágh is the summit of a lower range which runs west, and is parallel to the Taurus. The whole of the Taurus, from the Allah-Dágh west as far as the Bábá-Dágh (Mons Cadmus) in 29° E. long. has not yet been explored, but parts of its snowy chain have been traversed by a few travellers, or seen from the sea in the Gulf of Adalia.

The Bábá-Dágh, or most western part of the Taurus, continues its original western direction under several names
forms the watershed between the Mendere, the antient
ander, in the north, and the Dollomon-Cháí, and s
smaller rivers which flow into the sea of Rhodes, the G
Cos, and the Gulf of Mándeliyeh.

The whole tract which lies between the range
Taurus and the Mediterranean, and the width of whi
pends more on the curves of the coast than on those
mountain range, has an alpine character, though the
are not so high as the Alps of Tyrol or Switzerland.
sembles the parts of Hejáz, Yemen, and Hadhram
lie between the great chain of the Yemen-Hadhr
tains and the sea. Lycia is an independent part of
though distinguished by the same general outl
northern limits are formed by the principal ran
Taurus, from which branches stretch south, and
mately connected with each other by transverse ch
form a separate mountain system. The eastern part
table-land, but the western part is traversed in its wh
from north to south by the Xanthus, now Eche
the course of which we knew nothing till we became
with it through the discoveries of Fellows.

2. *The Anti-Taurus, the great table-land in th*
and its western continuation.—From the summ
Akjah or Commagenian mountains which we have
as the eastern commencement of the Taurus, the ey
beyond the river Tókhmah-Sú, its northern bounda
mense mountain tract bordered on the horizon by a
snowy peaks. This is the Anti-Taurus. Through its
and southern valleys the waters flow to the Euphrates,
western and northern parts are the sources of the Kizil-
and Yeshil-Irmák, which empty themselves into the Bla
The Anti-Taurus and the mountains of Commagene are
tural eastern limits of Asia Minor. The tract is little k
the Göl-Dágh and Kará-Bábá are two black basaltic mo
in the east, and on some of the neighbouring mountains
is found during the whole year. North of these peaks
is a chain called Aráb-Bábá, and beyond it, in a mo
turesque country, the high conical mountain of Sar
Chak, a Kurdish word meaning the highest mountain
easterly continuation of which is of basaltic origin.
neighbourhood are the Dumbugh-Dágh, which has a
rounded summit, the Erumbat and the Yámur-Dágh,
Ainsworth found covered with snow in July. Chalk is
in the environs of the Sari-Chi-Chak; west of it tra
rocks are prevalent, and the Dumbugh-Dágh consists
of euphotides abounding in iron, partly, on its northe
clivities, of granite. West of this tract there is a distr
gypsum. Beyond it, in the same direction, rises the ch
Kará-Bel, the Paryadres of the antients, covered with f
oaks, the crest of which has an elevation of 5790 feet
sured by the barometer (Ainsworth). The Paryadres
most northern part of the Anti-Taurus, the principal ch
which stretches west as far as tho Arjish-Dágh or
Argaeus, in 38° 30′ N. lat., and 35° 20′ E. long., the h
peak of the peninsula, and once a volcano. On appro
this cone, says Hamilton, the appearance of the count
comes gradually more wild; the hills consist entirely
chytic rocks, and the surface is covered to a great exten
boulders of the same formation. Vesicular basalt, bo
of which overlay a yellow feldspathic rock, cover the sho
of the mountain. After having passed over hills of
basalt, Hamilton reached a conical hill, consisting o
and ashes with a crater partly broken; then a rocky
covered with juniper, where the real ascent begins.
of the highest peak stands the Kartún, an isolated r
feldspathic trachyte, like a gigantic fortress. Two
walk further up, the ground spreads out into an amphith
surrounded by steep and lofty ridges of hills, whe
party passed the night. On proceeding further on th
lowing day, they found snow in all the crevices, an
obliged to find their way over dangerous glaciers.
succeeded, however, in reaching the highest attainable
of the mountain, though not the actual summit, whi
mass of rock with steep perpendicular sides, rising to a
of 20 or 25 feet above the ridge on which they stood.
summit is a red bracciated scoriaceous conglomerate
taining fragments of trap, trachyte, and porphyry.
north and north-east extensive glaciers stretched down
unbroken slope into a sea of clouds, proving all ascent
side to be totally impracticable. From barometrical o
tions combined with the result of two angles of el
taken from different spots below the mountain, Hamilt

t the height of Mount Arjísh is 13,000 feet, a
or less, above the sea. Ainsworth calculates it
feet lower. Strabo observes (p. 538 Cas.) that
eus was covered with eternal snows, but his state-
oth the Euxine and the Mediterranean are visible
nit is not true. Mount Arjísh, and Mount Allah-
lies about 30 miles south of it, are the two
promontories of the Anti-Taurus properly speak-
ipal chain of which is the Allah-Dágh, accord-
on. A ridge of hills that stretches south-west
ish becomes gradually higher, forms the peaks
h and Karájah-Dágh, and is connected with
the Kará-Dágh and the southern Allah-Dágh
ove. The Arjísh-Hasán-Karájah-Kará-Dágh
orth-west, the Anti-Taurus and its southern
the north and east, and the Taurus in the south
eastern most portion of the great table-land, and
ensive basin, part of which is called the plain of
ich. The eastern part of this basin is unknown
e middle part are the sources of the Síhún, which
and traverses the Taurus as stated above; and the
rt is a depression of the table-land which has no
tlet for its waters, the greater portion of which is
by the Ak-Göl, a lake of considerable extent. A
m, which after the melting of the snow increases
body of water, flows out of the southern corner of
nto a deep circular pool, 20 or 30 feet lower, and
a recess of the surrounding marble cliffs. The
out one-eighth of a mile in circumference, and has
or does any stream emerge on the other southern
hills, from which Hamilton concludes that the
find a subterranean passage through the limestone
ar on the south side of the Taurus, traversing
flowing into the sea.

ridge between Arjísh-Dágh and Allah-Dágh in
several chains stretch out in a western direction.
s we proceed from north to south, is a continua-
sh-Dágh, and runs under the names of Chewrí-
h-Dágh, Páshá-Dágh, Kartál-Dágh, Urá-Dágh,
-Dágh, at first west, and afterwards north-west,
the alpine tract round A'ngora; along its northern
sides flows the Kizil-Irmák. The second stretches
e range between the Hasán-Dágh and the Kará-
perhaps from the latter mountain, north-west as
t Emír-Dágh in 38° 48′ N. lat., 31° 20′ E. long.,
west to the Mórád-Dágh (the antient Mount
e), where it divides into different branches which
leys through which the waters flow into the
. The great rivers Mendere (Maeander) and
mus) have their sources in the environs of that
The first and second chains surround another
basin, forming likewise a depression of the high
of which the greater portion seems to have no
eastern part has certainly none, its waters being
p by the great salt lake Túz-Göl. In its north-
ts the second chain is double; it divides about
lat. and 32° E. long., and unites again at the
; the southern and probably principal chain is
ltán-Dágh; between the two arms there is a
, with the Ak-Sheher-Göl, a considerable lake
nd the little lake Iber-Göl, at a short distance
. The latter receives a little river about 40
hich originates not far from the Mórád-Dágh,
astern direction, which is rather unusual even
nd rivers of Asia Minor. The waters of the
into the lake of Ak-Sheher, which is not in-
rowsmith's map belonging to the 'Travels' of
Between the second range in the north-east, the
south, and the elevated ridge of the great table-
est, there is another basin, the largest of all,
to be subdivided into several smaller basins by
lges. This basin contains most of the great
uth-western part is still unknown.

of lakes in this basin forms one of the most
es of the table-land; they may be divided into
he salt lakes in the east, and the fresh-water
akes in the west. Among the salt lakes the
e largest, and of great extent; the others, such
f Sárimsák, Kúpek-Göl, Múrád-sú-Göl, most
n its immediate neighbourhood, cannot be com-
. The Túz-Göl was visited by Hamilton and
A point situated in 38° 42′ N. lat. and 33° 25′
about in its centre; its direction is south-east to north-west and north; it is about 45 English miles in length; its extreme width is about 18 miles, but its northern extremity is much narrower, and connected with the main lake by a channel five or six miles broad. A ruined causeway connects the opposite banks; it is covered with a thick coat of salt lying over a coat of soft mud: when the waters are high it is submerged; when low it is quite dry. The banks are flat, the environs barren and covered with saline plants; along its eastern side extensive salt marshes stretch from north-west to south-east, and its southern and south-western shores are surrounded by impenetrable marshes partly covered with saline incrustations. The lake yields much salt, which is easily obtained, although the state of saturation of the water, which is very high in the dry season, is diminished in the wet season, owing to several little rivers and streams emptying themselves into the lake. When Hamilton examined the water, in July, it was completely saturated, but it was less salt when Ainsworth saw it in April. Hamilton brought some of it to this country, where it was examined by Mr. Phillips of the Museum of Economic Geology, who gives the following account of the analysis:—"Its specific gravity is nearly 1·2398, but as a few crystals of common salt had separated, either by cold or evaporation, its specific gravity may be considered as equal to 1·24. It contains 32·2 p. c. of saline matter, consisting chiefly of common salt, but mixed with a considerable quantity of sulphate of magnesia and chloride of magnesium, with a little sulphate of lime and a trace of bromine, but no iodine." To this Hamilton adds, "The great peculiarities therefore appear to be its high specific gravity, and the great amount of saline matter. The specific gravity of the water of the Dead Sea, hitherto considered the heaviest, has been stated by Dr. Marcet at 1·21, that of sea-water being 1·028. The amount of saline matter contained in the water of the Dead Sea is, according to the same authority, only 24·5." Traces of volcanic action abound in the environs. Another circumstance of great interest is the apparent connexion between the rock-salt deposits and the red sandstone formation of Kój-Hisár, a small town on the eastern side of the lake near the causeway, with the same formation in Pontus, from which one might conclude that the red sandstone formation of Kój-Hisár belongs to the sandstone rocks which contain rock-salt between Yúz-Gátt and A'ngora, which themselves belong to the system of Pontus. A mass of grey granite protrudes through the red and brown sandstone near Kój-Hisár, sending forth numerous small veins into the adjacent rock, thus proving that the formation of the granite is posterior to that of the sandstone. Beds of white saccharine gypsum, or alabaster, are seen in the brown sandstone underlying the horizontal limestone.

The group of the fresh-water lakes begins with the Ak-Göl in the south-east, which has been mentioned in the descriptions of the first basin of the table-land. It is about seven miles long by three wide. West of it, in the third and largest basin, we first met with the Sóghla, the antient Trogilis, in 37° 15′ N. lat. and 32° 15′ E. long., which is about eight miles long and six wide, and the lake of Bei-Sheher, the Caralitis Pusgusa of the Byzantines, in 37° 40′ N. lat. and 31° 50′ E. long., a magnificent sheet of water which extends above 20 miles from south-south-east to north-north-west, and is from four to seven miles wide. On its western side the rocks rise abruptly from the water's edge. The two lakes are separated by a lofty ridge of limestone mountains, through which the Bei-Sheher-Sú, the outlet of the Bei-Sheher lake, has formed a narrow channel. This river empties itself into the Sóghla lake, which has no outlet, and is consequently the deepest part of this portion of the basin. North-west of the lake of Bei-Sheher are the lakes of Egerdir and Hóírán, which however are one lake; the northern part is called Hóírán, and the southern Egerdir. The narrow channel by which they are united lies in 28° 8′ N. lat. and 31° 3′ E. long. Their combined length is about 30 miles, and each of them is about six miles in its greatest width. They are full of fish, and surrounded by steep and wooded hills, intersected by picturesque valleys and well-cultivated plains. Hamilton compares their appearance with that of the lakes in Italy. North of them are the lakes of Ak-Sheher and Chái-Kö, already mentioned. The lake of Egerdir has a southern outlet, a deep, clear, and rapid river, the further course of which is not known. The question as to the course of its waters is of high geographical importance. If it flows due south the river will be barred by the great chain of the Taurus; and although it is possible, but not probable, that it forces itself an open passage through that range, and reaches the Gulf of

Adalia, it is as likely that it escapes through the limestone of the Taurus, and, after a subterranean course of considerable length, reappears on its southern foot as a new river. If however that river flows into the neighbouring lake of Bei-Sheher, which empties itself into the lake Sóghla, we see a small lake with no visible outlet, although it is fed by the waters of two very large lakes, and perhaps those of the whole basin. As it is not likely that such a volume of water is evaporated from a comparatively small surface, we should in this case also be led to believe that the water of the Sóghla lake escapes through some catabathron, and makes a subterranean passage through the Taurus, which Hamilton supposes to be the case with the lake Ak-Göl.

If we consider the most prominent features of the great table-land of Asia Minor, the great number of extinct volcanos, the masses of basalt and other volcanic productions, the innumerable basaltic cones which are spread in all directions on that plateau, the granite which protrudes through the overlying beds of limestone, and finally the salt lakes, and an extensive tract covered with salt marshes, we are inclined to believe that the whole was once an inland sea, like the Caspian and the Aral, filled with brackish water, and that the bottom of that sea was raised by volcanic action, whereupon the waters poured forth in all directions; and on their descent to the surrounding seas digged those deep valleys which, in the southern and western parts of the peninsula, lead in straight lines from the ridge, or exterior parts of the table-land, down to the Mediterranean, the Archipelago, and the Sea of Marmara. The diminished volume of the remaining waters might then have been absorbed, or have found subterranean escapes, till the tract remained in that state in which it is now. The great quantity of fresh-water shells found on the hills of the plateau are an objection to supposing it to have once been a perfect salt sea. It was either all brackish, or divided into several large lakes, some of fresh water and some of salt. It would be important to know, if among the fresh-water shells there are many belonging to such shell-fish as live indifferently in fresh and in brackish water. It will not be very difficult to explain why the courses of the rivers flowing into the Black Sea are not in straight lines. If the origin of the table-land should ever be satisfactorily shown to be what it is here conjectured to be, the peninsula of Asia Minor would no longer be considered a continuation of Armenia and Kurdistán, for the connexion between the mountain systems of those countries and the Taurus, the Anti-Taurus, and the Pontic mountains, is no obstacle to this conjecture; and as the great ranges which stretch through the country from east to west would in that case, with the exception of the Anti-Taurus, only be the edges of the plateau, the peninsula would be divided into the table-land, the eastern mountain-knot, and the outskirts along the three seas. But as long as these matters are merely hypothetical we must be faithful to the common division, which is made with reference to the great ranges that stretch across the country from east to west, and of which we now proceed to describe the third.

3. *The Euxine range.*—The country between the Anti-Taurus in the south, and the Black Sea in the north, is filled up with mountains, the centre of which seems to be in the southern part between the Gaúr-Dágh, the Almáli-Dágh, and the Gújik-Dágh, whence several chains stretch to the west and north; others stretching eastward connect these mountains with those of Armenia. We shall call this group, which has no general name, the Lazian group, from the Lazes, a warlike nation of Caucasian origin, known in history from early times down to the present day, and whose original abodes begin on the eastern slopes of these chains. The Lazian group, the third landmark of Asia Minor towards the east, is the watershed between the Euphrates, which flows into the Persian Gulf, and such of the rivers emptying themselves into the Black Sea as are situated east of the mouth of the Kizil-Irmák. On the eastern side of the crest of the Lazian group are the sources of the Chórúk-Sú, a river about 150 miles long, which flows east and north till it reaches the Black Sea near Bátúm: its whole course is beyond the limits which are generally ascribed to Asia Minor. Several smaller rivers flow from its northern slopes into the Black Sea. One of these is the Piksit or Surmel, a small river which has its mouth a little east of Trebizonde. A chain of woody mountains, which detaches itself from the eastern part of the Lazian group, and stretches as far as the sea, runs east of the Piksit, and may be considered the natural boundary of Asia Minor on this side. The eastern limits of Asia Minor are generally identified with an imaginary line stretching from
the corner of the Gulf of Iskénderún, due nor
a point situated some distance east of Trebi
map will show that this line corresponds
eastern face of the three groups, the Ta
Taurus, and the Lazian mountains. Amo
ranges which detach themselves from the L
shall first mention that long chain, or, more
of interrupted parallel chains, which run
parallel with the coast of the Black Sea. T
known under several names. Between Tre
mouth of the Yeshil-Irmák we find the Mason
tween that river and the Kizil-Irmák the Ne
its southern parallel ranges, the Ak-Dágh and
They are surmounted by lofty peaks, which a
lower than those of the Taurus and Anti-Tau
tract is a plateau, being the first terrace on
Black Sea; above it run wooded chains, with
of 1500 feet above the level of the plateau.
the plateau is broken into numerous ridges a
the beauty of which is highly praised by tra
picturesque character of the scenery is
the neighbourhood of the coast. The same c
west of the Kizil-Irmák, from the point
through the chain of the Adá-Dágh. The I
mean elevation of 4000 feet over the sea, abo
of fir-trees that yield excellent timber; and
is a plateau of the same description surmoun
about 3200 feet elevation. South of these
Alkás-Dágh, the summit of which was foun
snow in October; and north of them are the
and others which border on the sea. In 41
33° E. long. is the plateau of Iflání, whic
south near the town of Záfarán-Bólí, with se
which terminate abruptly with steep accli
high rock-terraces tower one above the othe
teau there are many ranges, partly bare and
and large tracts are covered with fragments
of this plateau, and divided from it by th
is Mount Durnah-Yálá-sí, the antient
which has rough slopes, wooded sides, and
least 3000 feet high. Limestone and basaltic
both of these mountains. Mount Durnah-Yál
with the Bólí-Dágh and the Karám-'Ali b
Yálá-sí and the Yáflá-Dágh (Mons Hypius
and the Kará-Dágh, the O'wah-Dágh, and
Dágh, in the north. West of the Karám-
Gök-Dágh, or Bithynian Olympus, and betw
the Zákáríyeh or Sangarius. The Gök-Dágh
eastern beginning of the Keshish-Dágh, or
of Brusa; its western projections stretch thr
terminate in the promontories of the sea
Hellespont, and the Archipelago.

Having thus traced the outlines of the
which begin in the east with the Lazian grou
give a sketch of the mountain tract betwe
in the north and the great table-land in th
the junction of the western chains of the L
with the Kará-Bel, which have been alread
northern continuation of the Anti-Taurus, so
west, which the natives call Gemín-Belí-Dá
Dágh. They are generally parallel with the
N. lat., and their western continuation is
They rise above a high table-land, which is
plain, and form the watershed between the
the north, and the Kizil-Irmák in the south.
tainous tract lies to the west and is encompass
west and north by the great bend of the
which we know very little. It is a table-lan
which, towards the Kizil-Irmák, are intersect
leys and ravines, and form a long sharply i
rocks of the grandest character. Pursuing
of the Kizil-Irmák, from the 36th degree
first see the Ak-Dágh right opposite the
the Arjísh-Dágh, stretching west. Where
first takes a north-west direction, the edge o
is called Akjik-Dágh; farther on in the s
the Hasán-Dágh, a bare sharp two-headed
farther on the Báránlí-Dágh, a lofty chain r
a table-land more than 3000 feet high, and co
in April. This tract chiefly consists of grani
gether a sierra-like aspect. North of the
the fine plain of Sógher, and north of it l
Dágh, an extensive granitic district, com

whitish, and bare hills, broken up by deep ravines, ed with a scanty vegetation. The northern edge of land surrounded by the Kizil-Irmák begins at Tókát ′ N. lat. and 36° 50′ E. long.(?), with a chain of one hills surmounted by steep and craggy pin- ich lower as they stretch to the west, parallel with, siderable distance from, the left bank of the Tókát- ürkhál the chain is again high, and presents several . Thence to Zilleh, south-west, and thence north is a high table-land, partly fertile, partly a barren sed of limestone, which is prevalent near Amasia. edges of this plateau towards the Tókát-Sú rise height above the valley and are broken by deep The rocks near Amasia are highly picturesque, and ption which Strabo (p. 561, Cas.) gives of his birth- been verified by modern travellers. From Amasia a low hills, consisting chiefly of volcanic sand or pepe- inally stratified, runs west, partly bordering the st of Amasia; 13 miles west of this town the hills rise ge masses of rocks. From Chórum the table-land has character, being partly a level plain and partly a hilly which to the north of that town is bordered by the Kirk- mountains, which may be considered as the most projection of the great table-land. The tract from south-west as far as the Begrek-Dágh described little known; its edge towards the Kizil-Irmák ggy and deeply cut than the sides of the table-land e Tókát-Sú, except the immediate environs of About 30 miles west-south-west from Chórum, and distance from the Kizil-Irmák, are the rock-salt Cháyán-Kö, situated in a rugged ridge of hills dstone conglomerate. The surrounding coun- lly towards the river, is a succession of hills, f red marls and gravel of a grey or bluish colour, unterpart of the saliferous districts of England. órum, towards the interior of the table-land, there n of winding valleys sunk below the level of the lying between schistose rocks varying much in onsistency. The high plain has a barren aspect. a-gátt, south of Chórum, there are deep ravines, roken rocks, which amidst protruding masses of er igneous formations bear evidence to the convul- have agitated the country. The waters flow east into the Tókát-Sú, a fact which proves that f the table-land is towards the north. A little a-gátt is the Habak-Tepe, a lofty hill, and the minating point of the tract whence ridges radiate tions: some of them consist of coarse sandstone, s a loose conglomerate containing pebbles of blue limestone, secondary limestone, jasper, sandstone, e rocks. West and south-west of the town of nd at a considerable distance, there is a range of alled Chichek-Dágh, which seems to be the edge d terrace of the table-land, on ascending it from he first being formed by the Begrek-Dágh and the h described above. The tract east of these two nd A′ngora is likewise an elevated table-land, by deep valleys and ravines, through which the and the Zákáríyeh with its tributaries have forced and has in many places an alpine character. us consist of trappean or granitic rocks, upon d sandstone appears to have been deposited as in nestone occurs everywhere with masses of tra- tion overlying it. On the plateaus there are s of mountains with broken and picturesque out- igh cones of volcanic origin bear evidence that he country has been reduced to its present state of fire, and that the work was completed by plateaus, especially that of Háímaneh, are bleak e, but the valleys are fertile, and yield corn, it of every description. Among the chains that directions are the Ardij-Dágh, south of A′ngora, feet high; the Kartal-Dágh, south-east; the ast; the Kará-Bazár-Dágh, north-east; and the and Ishik-Dágh, which form one or perhaps more s interrupted by table-lands which begin about of A′ngora and stretch in a north-eastern direc- 50 miles. The base of the hills is formed of umber of basaltic prisms of great regularity of ertically disposed, others horizontally. Above of a similar character tower up in rocky pin- tastic shape, in which the colossal prisms are posed. This motley distribution of basaltic prisms, says Ainsworth, surpasses anything at the Giants' Causeway, Fairhead, or the Cave of Fingal, and most resembles sketches that have been published of the volcanic scenery of the islands of St. Helena and Ascension. In the northernmost corner of these mountains, in the valley of the Kerimis-Sú, near its sources, are the mines of Sahlún. There another table-land begins, the slope of which inclines towards the Black Sea, which is only 75 miles distant. The Kerimis-Sú flows south and joins the Zákáríyeh. The height of the plateau near A′ngora is 3000 feet above the level of the sea, and as it is one of the lowest, the average height of the surrounding table-lands may be fixed between 3000 and 4000 feet. They are consequently about 2000 feet lower than the plateau of the great central table-land, the average elevation of which has been estimated at from 5000 to 6000 feet; and they are 2000 feet higher than the table-lands that occupy the northern margin of the peninsula along the Black Sea. It would therefore seem that the part of Asia between the Black Sea in the north and the Taurus in the south is composed of three terraces, which we may call the Euxine, the Galatian, and Phrygo-Cappadocian terraces. The beds of the rivers which originate on the Galatian terrace and descend through the Euxine terrace to the sea, are not (so far as we know) interrupted by steep transverse barriers, so as to make the waters flow down in cascades, whence we may conclude that the ascent to the terraces is gradual, unless future observation should show that such cataracts have existed, and that the opposing barriers have been washed away by the water. Considerable portions of the courses of the Yeshil-Irmák, the Kizil-Irmák, and especially the Zákáríyeh (Sangarius) are still unexplored and offer a good opportunity for such observations; and it would be no less interesting to examine the pass through which the Síhun breaks through the Taurus.

The tract between A′ngora and the upper part of the Zákáríyeh and thence westward as far as Mount Olympus is very little known, except in its south-western part, which is traversed by the great road from Constantinople to Kútáhíyeh and Kóníyeh which passes over a high plateau of barren aspect. The same character prevails in the middle district, between Kútáhíyeh and the left bank of the Zákáríyeh, with the exception that the eastern part, between Germá and A′ngora, contains large plains and some valleys, where the clayey soil is well cultivated. Chains have been seen there stretching from east to west. The highest portion of this table-land seems to be between Séwri-Hisár and Kútáhíyeh, where the river Zákáríyeh is supposed to have its origin. The northern part of the tract has scarcely been visited at all: a Turkish gentleman of Brúsá who has several times travelled on the direct (?) road from that town to A′ngora, and crossed the Zákáríyeh by a stone bridge (at Kíwá?), has told the writer that the country is generally level, but is mountainous east of the Zákáríyeh, and that this river flows in a beautiful winding valley between high and steep rocks.

This sketch will be concluded with a few remarks on the mountain system in the most western part of the peninsula. The Mórád-Dágh, which has been described as the western promontory of the midland system of mountains, is a centre from which several high ranges stretch west and north. A lofty and wooded chain connects it with the Olympus of Brúsá, separating the fertile valley of the Edrenos from the barren table-lands of Kútáhíyeh. A second chain branches west under the names of Ak-Dágh and Demirjí-Dágh, and terminates with Mount Ida: two parallel branches of this chain stretch north: they are the watersheds between the river Edrenos in the east and the Simáúl-Sú in the west, and between this river and the small watercourses that flow into the Hellespont. A third chain runs south of and parallel with the A′k-Dágh and the Demirjí-Dágh, forming a barrier between the river Ghiediz-Cháí in the north and the Mendere or Macander in the south. The western part of that chain branches and forms the Kiziljá-Músa-Dágh, the antient Tmolus, in the north, and the Kestáne-Dágh, the antient Messogis, in the south: between them flows the little Mendere. The Bábá-Dágh, a lofty chain that rises south of the (Great) Mendere, belongs to the Taurus range, as mentioned above: its height must be very great, since Fellows saw its snowy summit from the high table-land near Kútáhíyeh, a distance of 150 English miles, which however he incorrectly states at 110 miles only. The tract between the Bábá-Dágh and the Mórád-Dágh is a high table-land, though not so high as the great central table-land; and it seems to be an intermediate terrace between that tract and the less elevated plateaus on the western coast. Its general aspect is barren, whole districts being covered with sand and fragments of volcanic products; basaltic cones rise everywhere, marble is abundant, limestone occurs generally, and in many places the surface of the table-lands is undulating. This circumstance gives additional strength to the hypothesis that the central table-land was once a lake. The Mórád-Dágh with its eastern chains, the Sultán-Dágh and the Emír-Dágh, and its western continuations the Ak-Dágh and Demirjí-Dágh, consist of schistose and metamorphic rocks; most of the trachytic outbreaks occur on this line; the peaks are generally trachytic or basaltic rocks, and traces of former eruptions are very numerous. This chain is part of the great central axis of the peninsula; its height must be considerable, since the whole range was covered with snow in the month of April. The chains by which the Mórád-Dágh is connected with the Olympus, and between which the river Edrenos flows, begin in the south with trap dykes which have burst through crystalline limestone and yellow schist, traversed by numerous veins of quartz; farther north the declivities show cliffs of white cretaceous limestone, with a horizontal stratification in which Strickland discovered fossil fresh-water tertiary shells. Mount Olympus is supposed to consist of plutonic rocks, which are indicated at its northern and western foot by beds of limestone penetrated to some distance by quartzose granitic veins; the limestone is of the scaglia formation. Towards the lower part of the river Edrenos there are greenish trachytic rocks.

The general characters of the geology of the peninsula, says Hamilton, are simple. The eastern extremities consist of trachytic rocks, which towards the west are succeeded and partly overlaid by black volcanic breccia and peperite, containing angular fragments of trap or trachyte. The western part of the peninsula consists of calcareous rocks which seem to belong to the scaglia or cretaceous formation. All these are horizontal, and the lower portion is a hard compact scaglia like that of Greece and the Ionian islands. This (the lower, hard portion) contains no fossils, but is overlaid by beds thirty or forty feet thick containing a great variety of shells, amongst which are Corbula and Modiola. The beds vary considerably in hardness, and some are rather silicious. Near the summit of the hill are the antient quarries, in which lie large blocks hewn and ready to be removed. The same writer says that he could not find the line of junction between the limestone and the trachyte, so as to form any conjecture of their relative ages.

Hydrography—1. *Rivers.*—Our knowledge of the rivers and lakes of the peninsula has been greatly extended by the discoveries of recent travellers. In enumerating them we proceed from the gulf of Iskénderún west along the coast of the Mediterranean, &c. The Jíhun (Pyramus) has its sources near Merásh in the eastern beginning of the Taurus, in 37° 35′ N. lat., 36° 55′ E. long., flows south-west for above fifty geographical miles, through a narrow valley, along the western foot of the Dúrdún-Dágh, turns south and south-west, pursuing that course for 35 miles, and taking a sudden turn towards east, falls into the small bay of Ayás. Its antient course from the point where it turns east was south-west and south-east, and its former mouth may still be traced near Cape Kará-Tásh at the entrance of the gulf. Its whole length is above 100 miles; it receives on its right the Sáúrun, which descends from the Taurus. Its upper part is confined between steep rocks; it reaches the plain of A′dána in 37° N. lat., but the hills of the Dúrdún-Dágh accompany it in the east as far down as Mount Misis. The lower part of the Jíhún is navigable. The sources of the Síhún, the antient Sarus, are in the central table-land in 37° 42′ N. lat., 34° 25′ E. long.; its course is about 50 geographical miles south-east through the Cilician defiles of the Taurus, and 40 geographical miles south-west till it reaches the gulf of Iskénderún in 36° 44′ N. lat., 34° 53′ E. long. It enters the plain of A′dána above this town, and is navigable in its lower part. The whole length is about 90 geographical miles. The whole course of the Síhún and the Jíhún is not known.

The Tersús-Chái, the antient Cydnus, a small river, originates near the southern entrance of the Cilician pass, on a plateau of 3800 feet elevation, and after a south-south-east and south-west course of 40 geographical miles, which is only partly known, empties itself in the sea a little west of the mouth of the Síhún. The Gök-Sú (Calycadnus) has its sources in the Taurus, in about 37° N. lat., 33° E. long.; it drains the western part of Cilicia, and after a south-eastern course of about 65 miles through a mountainous tract, joins the sea a little below Seléwkeh, the antient Seleucia. Among the rivers mentioned by the antients in Pamphylia are the Eurymedon, the Cestrus, and the Cat
maps do not give the present name of the Eurym
river designated by that name is described by
noble river; the Cestrus is the present Aksú,
ractes the Dúdon. They are not inconsiderable.
courses that have been observed on the centr
north of the Taurus, which flow from west to east,
to be their respective sources. It is not unlik
Eurymedon is formed by the southern outlet of
Egerdir mentioned before, and that it is swe
waters of lake Sóghla after they have forced
through subterranean passages across the Taur
volume of the water of the Eurymedon is too
river the length of which would not exceed 60
miles, if its sources lay only in or a little beyond
range of the Taurus. The Xanthus is now E
The description of this river will be appropriat
panied with a few remarks on Lycia, one of the m
ing parts of the peninsula, and unknown to E
Fellows published his account of that country. T
has its sources in the snowy range of the Taur
due south as far as Hórán,* where it receives a
tributary of about 25 miles length, and much lo
portion of the main stream above that point. F
the river winds through a beautiful valley betw
hills and picturesque rocks in a south direction w
western inclination; and a little below the ruins o
city of Xanthus it turns abruptly west and falls i
after a course of about 50 miles. Below Hórán
by a fine bridge of five arches. The tract sou
between this bridge and the bay of Makri (Gla
west, the river Xanthus and the sea, is filled
tains known by their antient names of Cragus a
gus, surmounted by peaks 3000, 3300, 5490, a
above the sea. From Hórán a range stretch
towards the sea, pressing close upon it with a
of 4800 feet elevation; the northern part is ind
map in Fellows' 'Discoveries in Lycia' as b
with (eternal?) snow. This is the antient Mon
East of it is the high table-land mentioned abo
a mean elevation of more than 4000 feet, being
antient district of Cibyratis, a name which in t
period designated the whole country of Lycia,
being known as the best sailors among the
cially for ships of war. On this table-land the
that falls into a cavern and disappears. A fe
of the cavern there is the lake of A′welán, whic
let, is three or four miles wide and ten long, an
middle of a highly cultivated plain which is ab
high. Between the table-land and the eastern
is the Taktalu-Dágh, the antient Mount Solyma,
summit 7800 feet high. The range of Mons M
the table-land beyond it form a terrace which is
the Taurus, but higher than the elevated tra
southern shore. The tract along the shore is tr
west to east by the little river Dembre; it is a t
than the table-land, and rising with bold pre
the sea. The exterior of Lycia resembles on a
the northern part of the peninsula between t
and the central table-land; and the Dembre and
are on a small scale in the south what the Yeshi
Kizil-Irmák are on a large scale in the north.
relation in which Lycia stands to the whole p
peninsula with its central table-lands, barren r
salt and other lakes without outlets, and lower ter
to the coast, where the vegetation is quite differe
of the midlands, stands to all Asia, and this
might not have escaped the keen eye of the la
and suggested to them the name of Asia Min
Asia.

The next river to the Xanthus is the Do
(Calbis). Its sources are supposed to be a
N. lat., 29° 50′ E. long., in the high table-la
the range of the Taurus, and the part of it visite
flows in a deep ravine through a plateau 5000 fe
course, which at first is from east to west, soon be
west, but nearly the whole of it is unknown, ex
near its mouth, a little north-west of Cape Gh
Fellows had much trouble in crossing it. The
is nearly 100 miles. No large river occurs betwe
mon-Chái and the Mendere. This river, th

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* In Arrowsmith's map belonging to the Journal of Hamil
its course is north west to south-east.

s source in 38° N. lat., 30° 20′ E. long., in
alocrenas) stretching from east to west towards
, and bordering the elevated plains of
on states that it issues from a small lake fed
prings, and surrounded by steep and lofty
is corresponds with the account of Pliny.
ináír, the antient Apamea Cibotus, is close
virons is the spot in the plain where Mar-
arly for his presumptuous rivalry of Apollo
abasis, i. 2); but the cavern where Apollo hung
his rival seems to have fallen in. The course
24 geographical miles north-west, through the
Dínáír; 16 geographical miles south-west, and
l miles north and north-west, partly through
partly through a deep rocky valley; 110 geo-
s west-south-west, in numerous windings through
lley that becomes wider and more fertile as it
e coast. Its whole course is above 170 geogra-
ls tributaries are, on the right, the Sanduklí-Cháí,
om the south-eastern continuation of the Mórád-
Bánás Cháí, 50 geographical miles long, which
t of the Mórád-Dágh, and joins the Maeander
er begins its regular west-south-west course.
a smaller river, joins the Bánás Cháí imme-
ts junction with the Maeander. From this
e coast only small streams join the Maeander
On the left it is joined by the Chóruk-Sú, the
small river flowing from east to west; the
nus?), a still smaller stream, which comes
nt Bábá-Dágh; and the Chíná-Cháí, the
the sources of which are about 35 geogra-
h-south-east from its junction with the Mae-
tern continuation of the Bábá-Dágh. The
the antient Cayster, has its source in the
the Kestáne-Dágh (Messogis) in the south,
-Músá-Dágh (Tmolus) in the north. It
lf of Scala Nuova, after a western course of
miles. The Kodus or Ghiediz-Cháí, the
has its sources in the Mórád-Dágh, south-
of Ghiediz; its course is 20 geographical
south-west, nearly 100 geographical miles
west direction, and 15 geographical miles
till it falls into the bay of Smyrna, which
clayey and sandy deposits. In its upper
er of consequence that joins it on the left is
nus, now Allah-Sheher-Sú (?), the sources of
few miles from the middle part of the Maean-
g. It joins the Hermus after a north-west
s, through a beautiful and highly cultivated
right, the Hermus receives in its upper part
nd the Demirjí-Cháí (Hyllus?), two small
e from the Ak-Dágh and the Demirjí-Dágh,
part it receives the Ak-Sú (Hyllus?). The
e Hermus, between the mouth of the Coga-
den turn which it makes near its mouth to
imperfectly known. North of the Hermus
áí (Caïcus), the Túzlá, and the Mendere
ander), flowing west, and the Bóklá-Cháí
ch flows north into the sea of Marmara. The
ver which flows into the sea of Marmara is
antient Rhyndacus, which is formed by the
rivers. One of them, the Rhyndacus or
originates in the lofty chain which connects
rád-Dágh and Ak-Dágh, and after a wind-
urse through a beautiful valley falls into the
ullionte (Apollonias); it issues from the
f this lake, and empties itself into the gulf
er a course of above 120 geographical miles
es. The other branch is the Súsúgherlí-Sú,
stus, which comes from Símáúl, at the foot
where it is called Símáúl-Sú: it flows west
cal miles, and north for 80, and joins the
e below the point where it issues from the
. The Rhyndacus also receives the Kará-
let of the great lake Máníyás. Until Hamil-
vers the subject of very careful examination
ittle about them. Between the Rhyndacus
h there are only small rivers, the Nílúfer
Brúsá, and the outlet of the lake of Iznik or
káríyeh, the antient Sangarius, is the second
the rivers of the peninsula. Its sources are
table-land between Kútáhíyeh and Séwri-
river passing by Chánder in 39° 16′ N. lat., 31° 24′ E. long., is the main branch; or a river which comes down from the Emír-Dágh, in a northern direction, and passes by Hergán Káleh, is the principal branch. These two streams unite about six miles east of Chánder, whence the river flows east and north till it is joined by the Enguri or A′ngora-Sú, by which the mountainous tract round A′ngora is drained. From this spot, in 39° 45′ N. lat., 31° 55′ E. long., down to its mouth, the river has been seen by European travellers only at a few places. Its general course however is known, and in tracing it we follow a map of Bithynia, in the first volume of Hammer's 'Geschichte des Osmanischen Reiches.' This map will be found defective as to geographical correctness in many parts, but we may rely upon its general correctness, and with regard to its details and the names of localities; as there is perhaps no man in Europe who knows Bithynia, the original abode of Osmán and his tribe, so well as Baron von Hammer. The direction of the Zákáríyeh, from its junction with the A′ngora-Sú, as far as 31° E. long., is west; thence it flows west and north-west till it reaches the north-eastern promontories of the Ermení-Dágh, a lofty and wooded range connected with the Olympus of Brúsá by the Túmánij-Dágh. At the foot of the Ermení-Dágh, near Sögüd, a few miles west of the Zákáríyeh, stands the tomb of Er-tóghrul, the father of Osmán. From the Ermení-Dágh, which is close to the stream, the river takes a more northern direction. Below Sáríkíá, a village about 10 minutes south of the latitude of Nicaea, the river is fordable at a place called 'Sürkün,' that is 'ford.' The most western part of the river, according to the map, is in 30° 10′ E. long.; but we cannot rely upon the map as to the fact; and the curve of the river in this part varies much in different maps. In the latitude of Nicaea there is a stone bridge over the river near Kíwá (Kinneir's Gaiwa), and here the great roads from Constantinople and Nicaea to A′ngora unite. From that spot the direction of the Zákáríyeh is north-east, and in the latitude of Nicomedia it turns suddenly east, but it soon flows north, north-north-west, and north, and it enters the sea in 41° 71′ N. lat., 30° 42′ E. long. From the point where it suddenly turns east the river formerly ran north, and the old bed is still visible. A fine bridge of antient construction, 1087 feet in length, leads across the bed, through which a small arm of the Zákáríyeh flows north. Near this spot the main branch is crossed by a wooden bridge. Near Kíwá the Zákáríyeh flows for 13 miles through a gloomy intricate defile, with high and rugged precipices rising perpendicularly on both sides. The summits of the mountains are covered with excellent timber, oak, beech, sycamore, and ash. The Sangarius, says Kinneir, is in general about 100 yards wide (near Kíwá), contains an immense body of water, and flows with surprising rapidity. The stone bridge over it was, according to an inscription, built by Sultan Bayázíd (I.?), and the middle arch was broken by the force of the current. Ainsworth crossed the river on a wooden bridge near the antient bridge, which is over the dry bed. The width of the river was 372 feet, with an average depth of two feet, and a rate of about three miles an hour. He adds that the river was liable to considerable rises: he crossed it in September, the driest month of the year. The tributaries of the Zákáríyeh, besides those mentioned above, are on its left, the Pursúk-Sú, the antient Thymbrius, which comes from the Mórád-Dágh, and after a northern and north-eastern course of about 50 geographical miles, and passing by Kútahíyeh and Eskí-Sheher (Dorylaeum), joins the Zákáríyeh about 10 geographical miles below this town. The Yeníshcher-Sú (Melas?) joins the main river near Kíwá, after a north-eastern course of 50 geographical miles: it comes from the Olympus of Brúsá. A river which flows from the east falls into the Zákáríyeh on its right, below Sáríkíá, after a westerly course of 40 miles. It has no name in the map, and may be the lower course of the Kerimis-Sú. The length of the Zákáríyeh may be estimated at 220 geographical miles. The distance in latitude between its mouth and the sources of the Thymbrius, which has often been taken for the main river, is 2° 20′; but between its mouth and the Chár-Sú, which joins the A′ngora-Sú, and consequently belongs to the upper system of the river, there is only a difference in latitude of 40′; and there are only 30′ difference between it and the sources of the Kerimis-Sú. The defile near Kíwá is the place where traces of former cataracts may be found, for the river here descends into the Euxine plateau. The mouth of the Filíyás, the antient Billaeus, is in 41° 35′ N. lat., 32° 6′ E. long. Its lower part has been visited by Ainsworth, who describes it as 'a noble river' flowing through a most beautiful valley from south to north. We know nothing of its upper part

except a portion of it near Záfarán-Bólí, where there is a wooden bridge over it. This is mentioned in the first volume of Ainsworth's 'Travels' (p. 66), and we are enabled, by an extract from his MS. journal, which the author has communicated to us, to add, that the junction of the Sóghánlí-Sú, a rivulet which flows from the plateau of Ifláni, with the Hamámli-Sú, 'a goodly river coming from the south,' about seven miles west of Záfarán-Bólí, forms the Filíyás. From this point the river flows west and afterwards turns to the north. The route of Ainsworth from the valley of the Kizil-Irmák, by Cherkesh and Bólí west to Dúzchah, is not laid down on the map which accompanies his work. Arrowsmith's map which accompanies Hamilton's 'Travels,' also leaves a blank for the country thus traversed by Ainsworth, and neither indicates the towns of Cherkesh and Chomomlik visited by the traveller, nor the water-courses which he crossed on his way. A careful comparison of the different passages in Ainsworth's work with each other and those of some other travellers leads us to conclude that the Hamámli-Sú, which flows from Cherkesh north up to the environs of Záfarán-Bólí, is the main branch of the Filíyás. The sources of this river must be looked for in the west, in the Bólí-Dágh. The Milán-Irmák (Hypius), which originates in the same direction, but further north, in the Yáilá-Dágh, and of which only the upper part is known, is most likely the first tributary which the Filíyás receives on its left. It may also be that the Milán-Irmák is the main river under another name. Bounded by the Bólí-Dágh on the south, and the Yáilá-Dágh, the Filíyás runs east; the mountains north-east of the Ishik-Dágh make it take a northern course: this portion is called Himámli-Sú; closely pressed in the north by the Durnah-Yáilá-sí (Mons Orminius), it turns west at Filíyás, but being stopped by the Kará-Dágh it flows north along the eastern foot of this chain. The Filíyás thus effects the drainage of the tract which begins between the mouth of the Zákáríyeh and the sources of the Milán-Irmák in the west, and is bordered in the south by the range between the Bólí-Dágh and the Ishik-Dágh, and in the east by the chains between the Ishik-Dágh and the Black Sea. The waters west and south of this border flow into the Zákáríyeh, and east of it they are tributaries of the Kizil-Irmák.

The Kizil-Irmák (Halys) is the largest river of the peninsula. Its sources are now known: they are in the Gemín-Belí-Dágh, in 40° N. lat., 37° 40′ E. long., in the northernmost part of the second or Phrygo-Cappadocian terrace. The river at first flows south, but it soon takes a south-west direction, which it pursues for about 150 geographical miles, through a picturesque valley, along the northern border of the great central table-land.

This part of its course is partly conjectural. In 38° 40′ N. lat., 34° 4′ E. long., it turns north-west, with some western bends, and flows in that direction as far as a point in 40° N. lat., 33° 34′ E. long., for about 75 geographical miles. This part is likewise imperfectly known. Thence it flows north-east, east, and again north-east as far as Osmánjík, for 100 geographical miles: this part is much better known. From Osmánjík its course is supposed, and has partly been observed, to be west for about 20 and thence north-east for about 30 geographical miles, as far as the defile of Kará-Tepe, a narrow pass overhung by huge precipices. A portion of this pass is formed by an angle of the main river, and another portion by the valley of the Gök-Irmák, called here Costambúl-Cháí, or Kará-Sú. From this spot the river flows south-east for 15 geographical miles, and thence north-east for about 40 miles. It empties itself into the sea by two navigable channels, in 41° 43′ N. lat., 36° E. long. The lower part is only known towards its mouth, which flows through a flat alluvial tract. The whole length is above 430 geographical miles: the distance in latitude between its mouth and its sources is only 1° 50′. We know of no considerable tributaries to this river except the Gök-Irmák, mentioned above, which rises in the mountains of Uzun-Búrún, west of Kastámúni, which lies on its eastern bank: the Gök-Irmák has an eastern course of about 70 geographical miles, and flows through a valley bordered by high rocks, and generally fertile and well cultivated. The Kizil-Irmák does not appear to be adapted for regular navigation by large craft: the waters are low in the dry season; but they greatly increase in winter and spring, when the snow melts on the high mountains, which supply its tributary streams. The Yeshil-Irmák, the antient Lycus, is the last considerable river in the eastern part of the peninsula: we know little of it. Its sources are at the north-western foot of the Lazian group,
in 40° N. lat., 39° E. long., and it enters
below the fortress of Chárshámbah after a nort
at last a north course of 100 miles. It receiv
the Tókát-Sú, the antient Iris, the sources of
tween Niksár, on the Yeshil-Irmák, in the n
large town of Tókát in the south. Its course
occasional bends to the north as far as Amasi
70 geographical miles, the windings include
Amasia west and north-west for 35 miles. T
receives on its left the Chóterlek-Irmák: its
the Kirk-Delím Mountains, north of Chórum
few miles east of the Kizil-Irmák; and it joins
after an eastern course of 60 geographical miles,
bends, through the nearly unknown plateau me
A little below its junction with the Tókát-Sú
Irmák descends through a narrow pass into the E
this is another spot where traces of former ca
discovered. The Yeshil-Irmák enters the se
mouths, the principal of which is navigable,
rounding tract is a delta formed by the deposi
East of the Yeshil-Irmák there are only
Hamilton was surprised at the large body of
many of them had notwithstanding the shor
course. The largest of these rivers is the Tir
sources are in the Lazian group, in 40° 20′ N.
E. long.; its mouth is a little east of the town of T
polis), in 41° 2′ N. lat., 38° 48′ E. long.; its dir
south-east to north-west.

Lakes.—Besides those mentioned in the des
great central table-land, there are the followin
of Abullionte (Apollonias) lies on the south-
of Bithynia, between Mount Olympus and th
dánieh: it stretches from east to west 20 miles
north to south. On the south it is bordered b
wooded mountains of the Olympus, on the
north by trachytic hills, and towards the
marshes. The north-eastern portion is studd
islands: on one of them, which is connected
land by a wooden bridge, stands the town of
antient Apollonia ad Rhyndacum. The town
islands, and the whole surrounding countrie
antient ruins. The lake abounds with fish, an
markets of Brúsá and Constantinople. The ri
280 feet broad a little below the spot where it
lake, and it is crossed by a wooden bridge. T
níyas, the antient lake of Melitopolis, is west o
lionte, on the eastern borders of Mysia: it is
from east to west, and 8 miles wide from n
The shores are low and marshy, but the tract
of it is well cultivated, and produces much
highly esteemed by the Greeks. At Kazaklí,
extremity of the lake, there is a Christian
descendants of a colony of Kossaks, but th
Turkish. The lake of Búldúr (37° 45′ N. lat., 30
is so called from the town of Búldúr, whic
the southern part of it: it contains five th
and has a numerous population, of which
portion are Greek. The length of the lak
east to south-west is about 17 miles, and it
four. The southern shore is flat, and the b
muddy. The neighbourhood produces much g
which comes from a low prickly plant (gón
species of furze. It is obtained by making
the stem near the root, and cutting through
the sap exudes in a day or two, and hardens in
after which it is collected by the peasants. Its
3s. 2d. a pound, and it is sent to Smyrna, wh
under the Turkish name of 'ketereh.' The wa
is blackish, with a strong taste and smell of sul
drogen gas: it is very shallow, and it is cove
fowl. The lake corresponds rather with the
the Palus Ascania by Pliny (*Hist. Nat.*, xx
cannot be the Palus Ascania of which Arrian
water was so salt that it crystallized naturally,
habitants felt no want of the sea, as they got salt
(Arrian, *Anabasis*, i. 29, ed. Schmied.) But t
lake in the neighbourhood which corresponds w
of Arrian. This is the lake of Chárdák, about
west of the lake of Búldúr; it is about 20 miles
north-east to west-south-west, and from two to f
it is surrounded by high hills, with precipitous
In summer the lake is very shallow, at least n
which are muddy, but in winter the water

tter is perfectly saturated with salt, which surface, and is scraped off the mud with ades. The broad muddy seam along its covered with salt coats, and great quantities lly produced here. A species of salicornia banks. This lake seems to be the Palus m; but it is also identified with the lake erodotus (vii. 30) as being situated near the in Phrygia, and from which salt was ex- e the more accurate knowledge of these four n. We omit the lake of Nicaea, though st picturesque sheet of water in the penin- thers, as they have either been described ls, or are not important enough in a general whole country.

ductions.—Both Hamilton and Ainsworth, ibuted so much to our knowledge of the irmán to inspect the mines, and they visited re hitherto unknown except to natives. in a very low state in this country. There near Bákír-Kurehsí, not far from the Black ear of Iflâni; near Chalwár, on the eastern n group; near Tirebóli, on the Black Sea; many other places. Iron-mines, near Unieh, silver with copper, in the mines of Tirebóli; t Denek, in the Begrek-Dágh, east of the itre is got at Kará-Búnár, in the south- he central table-land. Rock-salt abounds in lly in the north-eastern part of Asia Minor ound A'ngora. Hot springs occur in all the of Brúsá are celebrated, and are even visited ents. The hot springs near Eregli, in the t of the central table-land, require a short e out of narrow crevices on the summit of ills near that town, and form a succession of onical hills, which have been created by the f the earthy matter with which the water is ich forms at first small pools round each y the rapid evaporation of the water, are ones. The confined water and gases are der ground. Some of these springs deposit heir orifices, others pure sulphur, and others or gypsum, which is the most frequent. 307, &c.)

A closer examination of the accounts of leads to interesting results on this point. a line drawn from the corner of the Gulf of outh of the Zákáríyeh would divide the parts, so that in the western portion the n the majority, and in the eastern the Turks, In Lycia the Greek population is not one- population, and in Bithynia the Turks are at as numerous as the Greeks. The Greeks s in the western part than in the east, and siderable portion of the population of all owns, and several districts in the western ly inhabited by them. All those who call are not of Turkish origin, and there are thousand so-called Turks who are descended stors. There are also Mohammedan Ar- ast. Those among the Turks who style lis are settled in the country, and lead an ough many of them live during the summer ch they carry to those places which are used ricultural or pastoral purposes, leaving their the villages. The Turkomans are most ast; but such among them as are shepherds, madic life, wander as far as the table-lands ovinces. The Yürüks are nomadic Turks, me origin as the Osmanlis, and are numerous iddle, and eastern parts. In the same dis- nsiderable number of Kurds, who are either d, or wander with their herds to the western sometimes, though seldom, as far as Brúsá. sants are a brave and honest set of men, full hful, trustful, ready to assist, liberal, gene- neans so grave as the Turks are generally fond of social pleasures, chatting, dancing, y are very ignorant and credulous. Fel- ves too favourable a description of them; e Arcadia of Asia Minor. Religious pre- trong in the peninsula than in European rally the population of Anatolia may be considered as the best part of the whole population of the Turkish empire.

We add some of the routes of Hamilton, and some of the positions of latitude computed by him:—

1, Road from Múdánieh to Smyrna, distance in hours:—Múdánieh to Brúsá, 6; to Hasán-Aghá-Kö, 6; to Kirmaslí, 6; to Kesterlek, 4; to Adranos, 9; Harmánjík, 8; Táúshánlí, 8; Oránjík, 8; Azání, 2; Ghiediz, 8; Ushák, 10; Ahat-Kö, 6; Segikler, 5; Göbek, 8; Suleimánlí, 2; Tákínak, 6; Kúlá, 8; Adâlá, 8; Sardis, or Sert, 15, the direct road being but 12; Kassábá, 6; Smyrna, 12: 151 hours. 2, From Sinope to Amasia:—Sinope to Delliler, 4; Mehmed-Bei-Oghlú-Kö, 8; Bóyáwád, 6; Dúrán, 6; Cheltík, 9; Vizír-Köprí, 3; Káúwsá, 4; Ládik, 4; Sepetli, 9; Sónnísá, 3; Herek, 6; Niksar, 6; Tókát, 9; Zilleh, 4; Amasia, 8: 97 hours. 3, From Amasia to Affióm-Kará-Hisár:—Amasia to Háji-Kö, 12; Chórum, 6; Tekíyeh-Hatáp, 4; Alájah, 4; Yüzgátt, 8; Nefez-Kö, 6; Bógház-Kö, 4; Yüzgátt, 6; Alájah, 8; Súngúrli, 8; Kúchúk-Kö, 9; Kaláíjik, 9; Akjah-Tásh, 3; Ráwlí, 6; A'ngora, 6; Báluk-Kuyúmji, 6; Beijáyes, 6; Mölk, 6; Sewrí-Hisár, 8; Alekíám, 6; Hamzá-Háj, 6; Beiát, 6; Eskí-Kará-Hisár, 5; Affióm-Kará-Hisár, 4: 154 hours. 3, From Affióm-Kará-Hisár to Dínáír:—Affióm-Kará-Hisár to Akkar, 9; Yálóbách, 9; Aúshár, 5; Egerdír, 9; Isbártá, 6; Búldúr, 6; Ketzí-Burlú, 6; Dínáír, 4: 54 hours. 4, From Dínáír to Smyrna:—Dínáír to Bálát, 6; Káklek, 8; Chónós, 4; Denizli, 4; Sárai-Kö, 5; Kúyújá, 8; Názeli, 2; Aidín, 8; Ephesus, 10; Smyrna, 6: 70 hours. Latitudinal positions observed with Kater's circle:—Brúsá, 40° 11′; Azání, 39° 14′ 30″; Chárshámbah, 40° 11′; Vizír-Köprí, 41° 8′ 30″; Tókát, 40° 17′; Amasia, 40° 38′ 30″; Yüzgátt, 39° 47′ 45″; A'ngora, 39° 56′; Sewrí-Hisár, 39° 27′ 30″; Búldúr, 37° 42′ 45″; Dínáír, 38° 3′; Cyzicus, 40° 22′ 30″; Affióm-Kará-Hisár, 38° 43′ 15″; A'k-Sheher, 38° 17′ 30″; Kóníyeh, 37° 50′ 30″; Kaisáríyeh (Caesarea), 38° 41′ 50″; Kará-Hisár, 38° 20′; Karámán, 37° 9′; Isáúra, 37° 10′.

(Hamilton, *Researches in Asia Minor*, &c.; Ainsworth, *Travels and Researches in Asia Minor*; Fellows, *Asia Minor*; *Discoveries in Lycia*.)

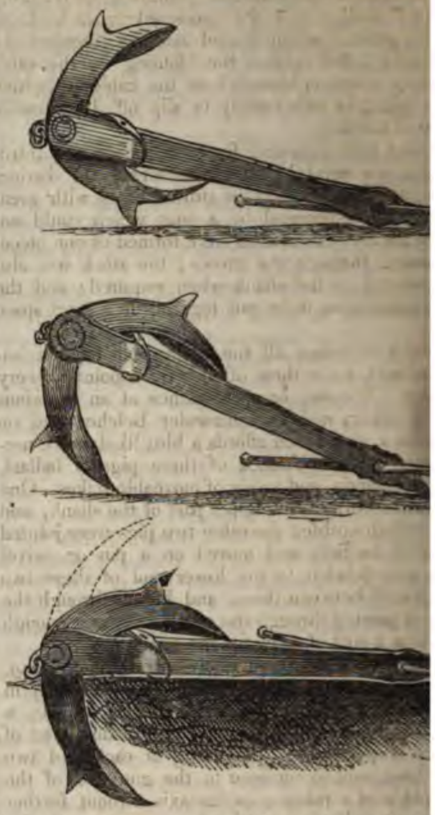
ANATOMY ACT. Before the passing of 2 & 3 Will. IV. c. 75, on the 1st of August, 1832, the medical profession was placed in a situation both anomalous and discreditable to the intelligence of the country. The law rendered it illegal for the medical practitioner or teacher of anatomy to possess any human body for the purposes of dissection, save that of murderers executed pursuant to the sentence of a court of justice, whilst it made him liable to punishment for ignorance of his profession; and while the charters of the medical colleges enforced the duty of teaching anatomy by dissection, the law rendered such a course impracticable. But as the interests of society require anatomy to be taught, the laws were violated, and a new class of offenders and new crimes sprung up as a consequence of legislation being inconsistent with social wants. By making anatomical dissection part of the penalty for crime, the strong prejudices which existed respecting dissection were magnified tenfold. This custom existed in England for about three centuries, having commenced early in the sixteenth century, when it was ordered that the bodies of four criminals should be assigned annually to the corporation of barber-surgeons. The 2 & 3 Will. IV. c. 75, repealed § 4, 9 Geo. IV. c. 31, which empowered the court, when it saw fit, to direct the body of a person convicted of murder to be dissected after execution. Bodies are now obtained for anatomical purposes under the following regulations enacted in 2 & 3 Will. IV. c. 75, which is entitled 'An act for regulating Schools of Anatomy.' The preamble of this act recites that the legal supply of human bodies for anatomical examinations was insufficient, and that in order further to supply human bodies for such purposes various crimes were committed, and lately murder, for the sole object of selling the bodies of the persons so murdered. The act then empowers the principal secretary of state, and the chief secretary for Ireland, to grant a licence to practise anatomy to any member or fellow of any college of physicians or surgeons, or to any graduate or licentiate in medicine, or to any person lawfully qualified to practise medicine, or to any professor or teacher of anatomy, medicine, or surgery; or to any student attending any school of anatomy, on application countersigned by two justices of the place where the applicant resides, certifying that to their knowledge or belief such person is about to carry on the practice of anatomy. (§ 1.) Notice is to be given of the place where it is intended to examine bodies anatomically one week at least before the first receipt or possession of a body. The secretary of state appoints inspectors of places where anatomical examinations are carried on, and they make a quarterly return of every deceased person's body removed to each place in their district where anatomy is practised, distinguishing the sex, and the name and age. Executors and others (not being undertakers, &c.) may permit the body of a deceased person, lawfully in their possession, to undergo anatomical examination, unless, to the knowledge of such executors or others, such person shall have expressed his desire, either in writing or verbally, during the illness whereof he died, that his body might not undergo such examination; and unless the surviving husband or wife, or any known relative of the deceased person, shall require the body to be interred without. Although a person may have directed his body after death to be examined anatomically, yet if any surviving relative objects, the body is to be interred without undergoing such examination. (§ 8.) When a body may be lawfully removed for anatomical examination, such removal is not to take place until forty-eight hours after death, nor until twenty-four hours' notice after death to the anatomical inspector of the district of the intended removal, such notice to be accompanied by a certificate of the cause of death, signed by the physician, surgeon, or apothecary who attended during the illness whereof the deceased person died; or if not so attended, the body is to be viewed by some physician, surgeon, or apothecary after death, and who shall not be concerned in examining the body after removal. Their certificate is to be delivered with the body to the party receiving the same for examination, who within twenty-four hours must transmit the certificate to the inspector of anatomy for the district, accompanied by a return stating at what day and hour, and from whom, the body was received, the date and place of death, the sex, and (as far as known) the name, age, and last abode of such person; and these particulars, with a copy of the certificate, are also to be entered in a book, which is to be produced whenever the inspector requires. The body on being removed is to be placed in a decent coffin or shell, and be removed therein; and the party receiving it is to provide for its interment after examination in consecrated ground, or in some public burial-ground of that religious persuasion to which the person whose body was removed belonged; and a certificate of the interment is to be transmitted to the inspector of anatomy for the district within six weeks after the body was received for examination. Offences against the act may be punished with imprisonment for not less than three months, or a fine of not more than 50*l.*

The supply, under this act, of the bodies of persons who die friendless in poorhouses and hospitals and elsewhere is said to be sufficient for the present wants of the teachers of anatomy; and the enormities which were formerly practised by 'resurrection-men' and 'burkers' have ceased. The number of bodies annually supplied in London for the purposes of dissection amounts to 600.

ANCHOR. Among the changes proposed within the last ten years in the construction of anchors, the most remarkable perhaps is that brought forward by Mr. Porter, for which a patent was obtained about five years ago.

The objects designed to be attained by this new construction are said to be mainly the two following:—the avoidance of the consequences of what is termed 'fouling,' by the cable passing over the exposed fluke of the anchor when the vessel is swinging in a tide-way; and the avoidance of injury to the vessel itself, in the event of falling upon her anchor. The peculiarity of the plan consists in giving to the arms and flukes a freedom of motion round a pivot or fulcrum at the end of the shank, thus departing at once from the rigidity usually observed in the construction of anchors. The arms and flukes are forged wholly independent of the shank, and have a hole drilled transversely through the centre, for the reception of the iron bolt which connects them with the shank. To give a familiar illustration, the joint may be described as of that kind which connects the wires of an umbrella with the ribs, so as to give a freedom of motion round the pin or bolt as an axis. The effect of this construction is, that when one fluke enters the ground, the other necessarily falls down upon the shank, thereby avoiding the danger incident to the upward projection of a sharp point.

A paper appeared in the 'United Service Journal' for 1844, in which the effect of this swivel action was rather minutely traced. When the anchor is dropped from the vessel, it descends swiftly and strikes against the bottom of the sea with great momentum (estimated, with an anchor of ten hun-
dredweight and a depth of twenty-four fathom
When the anchor rests fairly on the ground, its



with the lower peak, or tip, in contact with th
of the shank, the upper peak being as far as po
shank, as shown in position A in the above figu
slightest movement of the cable suffices to distu
and to bring the lower peak into a direction fitt
the ground, as at B. This libration continues
peak touches the upper surface of the shank,
peak is directed almost perpendicularly: a p
vourable for penetration, which then takes pla
and stock then lie flat on the ground, as in
chor, if pulled in the direction of the shank, ha
fix itself more firmly in the ground, by kee
fluke almost perpendicular in the ground.

It is evident that the free movement of the
of the shank must produce great modifications
which the anchor assumes under varying circum
efficiency of the change must be determined b
of practical navigation. Captain Denham,
Surveyor's Department at Fleetwood, gave a
experiments which he had tried in 1840 on
anchor, and states the following as the results
arrived:—'It is almost impossible to foul it;
into the most stubborn ground; it holds on
stay-peak; it cannot lodge on its stock end;
upper fluke to injure the vessel herself, or
water; it cannot injure vessels' bows when
bill, as merchant-vessels find a convenient pra
so likely to break off an arm, or part in the sh
with fixed flukes do, because the construction
can be of continuous rod-iron, and the fulcru
so much nearer the ring, owing to the pea of
closing upon the shank; it is a most conven
stowing inboard on a voyage, as the fluke
separated and passed into the hold; it can as
ported by two boats when one would be di
whole weight; it produces the desired effect
at one-twentieth less weight.' (*Unit. Serv.*
1840.)

In 1836 Mr. Meggitt patented an anchor in
flukes, or palms, are dispensed with, the flu
little broader than the arms; while at the sam
an increased width given to the crown by th
triangular piece of iron. The objects of these
the customary form are stated to be three in

of the anchor, not being encumbered by so usual, may be able to penetrate more readily ; 2ndly, that the increased breadth at the e greater strength and resistance against the able ; 3rdly, that the 'fouling' of the cable ely to occur, inasmuch as the cable, if twisted might be able readily to slip off, bv virtue of of the fluke.

ame period another form of anchor was introch the several parts were formed of distinct , so that it might be stowed away with great aveyed piecemeal by a boat which could not le anchor. The arms were formed of one piece, ng through the crown; the stock was also ured to the shank when required; and the justed as to be put together in a short space

ary to notice all the suggestions for the imnchors, since these often involve points of very ce. We may however glance at an ingenious n anchor, which Commander Belcher used on Ætna, and which affords a hint likely to be usecies. It was formed of three pigs of ballast, 56 pounds, and a pair of moveable flukes. One ballast formed the upper part of the shank, and with the cable ; the other two pigs were jointed d of the first, and moved on a pin or swivel were jointed to the lower end of these two placed between them, and bolted through the olt passing through the crown was long enough orm a sort of stock for the anchor.

st named has also devised a mode (*Naut. Mag.* hing anchors different from that customarily in boat, brought immediately over the anchor, is owing manner:—Across the broadest part of d a strong spar, projecting at each end two boat, and so confined to the gunwales of the pable of a rotation on its axis without further , or pulley, is retained exactly beneath the proceeding from the starboard end of the spar ; pe, proceeding from the larboard end, passes , and so descends to the anchor. The effect ent is, that when once the anchor is lifted , it hangs exactly beneath the keel, and thus buoyant power of the boat to be brought fairly anchor is raised by causing the rotation of the of levers inserted in holes in the spar. Capes that a boat will in this way nearly support he Ætna's cutters could each weigh a 10 cwt. a modification of the plan, in which two boats stead of one, a cutter of 25 feet long and a weighed an anchor of 50 cwt.

n very recently introduced a new mode of adlass for weighing the anchors of ships. In ement there are holes in the windlass-beam n of long levers, which are inserted in one r as the beam turns round. But Mr. Kenow-jointed fall purchase,' adopts a mechanical to that exhibited in a common fire-engine. of wood is firmly fixed on the deck, near the nd on the top of this is a pivot, or fulcrum, a transverse lever 16 or 20 feet long (for he men stand at either end of this lever, and ely up and down, in the manner of a fireach half of the lever descends a perpendicular t the bottom with a curiously formed jointed e rod descends, this lever catches in one of the et-wheel connected with the windlass-beam ; od rises, the lever forces the beam round a evolution. Every movement produces a porltant effect: for there are two vertical rods, rs, and two ratchet-wheels ; and when one of ressed, it produces a partial rotation of the eas when it is elevated, the other rod is so to produce working effect. There is a third t the middle of the windlass-beam, the teeth falls or detents intended to prevent the beam the contrary direction. The objects held in ention are—to render the performance of the ertain and more rapid ; to give an equal purller number of men than usual, or a greater n equal number of men ; and to strengthen the lass in any given position.

ANCHOVY PEAR. [GRIAS, P. C. S.]

ANCHU'SA, a genus of plants belonging to the natural order Boraginaceæ, and to the sub-tribe Anchuseæ of that group. The calyx is 5-fid ; the corolla funnel-shaped, with a straight tube, the throat being closed by prominent obtuse scales ; the stamens are included, and subsessile ; the fruit a nut, which is depressed. Don enumerates forty-six species belonging to this genus, which are chiefly inhabitants of the temperate parts of the earth, either on the mountains of tropical regions or the temperate zone. They are all of them rough plants, and are known, as well as the species of Lycopsis and Echium, by the common name of Bugloss. Some of the species have been used in medicine, whilst others are employed in the arts for dyeing. Two are inhabitants of Great Britain.

A. officinalis, common Alkanet or Bugloss, has lanceolate, hispid leaves, unilateral crowded spikes, ovate-lanceolate bracts, the segments of the calyx bluntish, hairy on both sides, the scales of the corolla hairy. The flowers are a deep purple. It is an inhabitant of Great Britain, on waste ground, but is a rare plant. In the south of France, Germany, and Switzerland, it is everywhere common, in uncultivated places, on old walls, and by the road side. The young plant is sometimes boiled and eaten. The roots contain a considerable quantity of gum, and when boiled yield a demulcent drink, which was once in repute as a medicine. In China this plant is used as a provocative of the eruption of small-pox. Several varieties are noted by European botanists, depending on the colour of the flowers, which are sometimes white, and on the greater or less hispid character of their leaves. Neither this nor any other species of Anchusa answers to the *Buglossus* of antient writers (Pliny, *Hist. Nat.*, lib. 25, c. 8), which possessed stimulating and exhilarating properties.

A. sempervirens, Evergreen Bugloss, has ovate leaves with lower leaves on long stalks, the peduncles axillary, each bearing two dense spikes with an intermediate flower, the segments of the calyx hairy on the outside only, the bracts minute lanceolate, scales of the corolla downy, flowers blue, salver-shaped. This plant is found on waste ground, near ruins, in Great Britain, but is rare.

A. tinctoria, Dyers' Bugloss or Alkanet, has diffuse stems, oblong hispid leaves, bracts longer than the calyx, the segments of the corolla shorter than the stamens. The corolla has a deep blood-coloured tube, with the limb deep blue. The root is woody, descending, and of a dark blood-red colour. This plant is a native of Peloponnesus, the island of Cyprus, and the deserts about Alexandria. It is cultivated in the south of France for the sake of the root, which yields a fine red colour to oils, wax, all unctuous substances, as well as to spirit of wine. Its chief use is in colouring lipsalves, ointments, &c. It is however sometimes employed for staining wood and dyeing cotton. It is also used for colouring many of the beverages sold under the name of port wine, likewise the corks used for the bottles in which this fluid is sold. The colouring-matter has been separated, and has been called by some chemists *Pseudo-alkannin*. This principle is found in greatest abundance in the external parts of the root, the inner being nearly destitute of it. An extract of this root was formerly used in medicine in hæmorrhages, but is now seldom employed.

A. angustifolia, Narrow-leaved Bugloss, has linear lanceolate hispid leaves, ovate-lanceolate bracts, 5-fid calyx, with blunt teeth. The tube of the corolla is pale purple, the limb deep blue. In gardens it attains a height of two feet ; but when wild it is not more than a foot high. It grows in Italy, Germany, and Switzerland, by road sides, amongst rubbish, and on the borders of ploughed fields. It was used by Boerhaave as a medicine ; but, like the order to which it belongs, its properties are too inenergetic to give it a standing-place in the Materia Medica of the present day.

In the cultivation of the species of this genus but little care is required, as they will grow in almost any soil, and are easily increased by seed. The *A. Capensis*, Cape Bugloss, requires the treatment of a greenhouse plant. Many of them are pretty annuals for the garden, as *A. paniculata*, *A. Barrelière*, &c.

ANCIENT DEMESNE. [MANOR, P. C. ; SOCCAGE, P. C.]

ANCIENT LIGHTS. [LIGHTS, P. C. S.]

ANCYLO'CERAS (D'Orb.). This fossil genus of M. D'Orbigny includes several species of Hamites (Phillips), from the Speeton clay and lower greensand.

ANDERSON, JOHN, the founder of the Andersonian Institution of Glasgow, and one of the earliest promoters of a triangle are equal to two right angles. Without going so far as to say that this *is* the definition of an angle, we should recommend it to be admitted and examined as what *might be* such. Though we have a distinct notion of an angle otherwise formed, by means of finite lines, we find much advantage in the knowledge of the following truth—The infinite spaces contained between lines have among themselves all the relations which exist among the angles formed by the lines. In the same manner the solid angle might be defined as the infinite solid space contained between three planes, that is, between such parts of them as lie between three infinitely produced straight lines which meet at a point.

ANGOLE. [Ongole, P. C. S.]

ANGOULÊME, DUC DE. [Charles X., P. C. S.]

ANGUI'SCIOLA, SOFONISBA, greatly distinguished as the 'Cremonese' for her ability in portrait-painting. She was born in Cremona, of a noble family, about 1533, and learnt painting first of Bernardino Campi at Cremona, and afterwards of Bernardino Gattj at Milan.

Vasari describes some of her portraits as wonderful, they possessed so much life. Her reputation having reached the ears of Philip II. of Spain, he sent two gentlemen and two ladies of the court in 1559 to invite and to escort her to Madrid, to enter into the service of the Queen of Spain. She painted a portrait of the queen, with which Philip was so much pleased that he sat for his own, and ordered Don Carlos likewise to sit to her. For these portraits Philip settled a pension upon her of 200 dollars, and presented her, according to Cean Bermudez, with a diamond of the value of fifteen hundred ducats. By these portraits and many others Sofonisba obtained a reputation for portrait-painting which was equalled by few of her contemporaries. Pope Pius IV. requested his nuncio at Madrid to procure him a portrait of the Queen of Spain by the hand of the Cremonese. Sofonisba sent the portrait with a letter to the pope in the month of September, 1561, and his holiness paid the fair painter the extreme compliment of an autograph answer in the following month, complimenting her highly on her performance. The letter and the pope's answer are both given by Vasari.

Sofonisba was married in Madrid to a Sicilian nobleman, Don Fabrizzio di Moncada, upon which occasion Philip raised her pension to a thousand crowns, and presented her at her marriage with twelve thousand crowns as a dowry. Her pension was to be drawn from the customs of Palermo, where, after her marriage, she resided with her husband. In a few years however she became a widow, but she found a second husband in the person of Orazio Lomellino, the captain of the Genoese galley in which she returned to her own country from Palermo. They were married shortly after her return at Genoa, with the sanction of the King of Spain, who again raised her pension to fourteen hundred crowns. She painted many pictures at Genoa, by which she added to her reputation, but as she grew old she became blind. She however did not lose her cheerfulness of mind, but became the centre of an intellectual society, her house being the resort of the principal artists and men of letters and virtù in Genoa. Vandyck, who frequently visited her, is reported to have said that 'he had learnt more from the conversation of a blind old woman than from the works of all the great masters of Italy,' a report which may not be true. Walpole says that Vandyck painted her portrait at Palermo when she was in her ninety-second year, which would be about 1625, but this statement must be erroneous in two respects,—she is not known to have returned to Palermo, and she is generally supposed to have died in 1620. If Vandyck painted her portrait when she was in her ninety-second year, it must have been in Genoa, and she probably was born before 1533: the dates however are very uncertain both of her birth and death. Vandyck was in Genoa in 1619 and in 1625, and perhaps between those dates.

The works of Sofonisba betray none of that feebleness of design and modelling which is frequently apparent in the pictures of female artists, and is particularly so in the works of Angelica Kauffmann. There are several portraits of Sofonisba by her own hand: there is one at Althorp in Northamptonshire, in which she is represented playing upon a harpsichord; there are two at Genoa in possession of the Lomellini family; there is one at Florence, and another at Vienna. She had four sisters, whom she instructed in painting, and who were all accomplished in the art.

(Vasari, *Vite de' Pittori*, &c.; Soprani, *Vite de' Pittori*, &c.; Cean Bermudez, *Diccionario Historico*, &c.)

ANIMAL CHARCOAL. [Charcoal, Animal, P. C.; Carbon, P. C.]

ANIMAL FLOWERS. [Actinia, P. C.]

ANIMAL MAGNETISM. In the artic
Magnetism and Somnambulism, P. C., referen
made to those phenomena which under these ter
of *Mesmerism* have excited much public interest.
found from those articles that although this subject
much attention on the continent of Europe, in Gr
it had obtained comparatively a small share of in
cently however animal magnetism has had directed
a great amount of attention, has been investiga
logists of eminence, and used as a curative
medical men. In the present article we shall
analyse the facts presented by animal magneti
to the rejection or adoption of any theory, but
give a fair view of its position and claims from t
those who have investigated its phenomena.

One of the first publications in this country
was by Mr. Richard Chenevix, a fellow of the
who published a series of papers in the 'Lond
Physical Journal' for 1829, entitled 'On Mes
perly denominated Animal Magnetism.' He
merous experiments, which were witnessed by
men, and amongst others by Dr. Elliotson.
Colquhoun published a work on animal magn
'Isis Revelata,' which attracted considerable at t
subject, and contained as an appendix a transla
port of a second French commission appointed to
this subject in 1831. This was followed by th
Baron Dupotet in London, who performed many
some of which were witnessed by Dr. Elliotson,
diately undertook the further investigation of
The result of the experiments of Dr. Elliotson,
published in the 'Lancet,' produced a great
phenomena which had hitherto been regarded
were constantly produced. Communications wer
at this time to various medical journals of rem
and among others were some from Mr. Herbert
professor of physiology at King's College, Lond
a work was published by the Rev. Chauncy Hare
entitled 'Tracts on Mesmerism, with reasons
sionate inquiry into it.' This work contained m
facts with regard to the phenomena of animal ma
1841 M. La Fontaine, a Frenchman, visited
commenced giving public lectures on mesmeris
bitions of its phenomena. Whilst in Manchester
the attention of Mr. Braid, a surgeon residing
having repeated and modified variously the ori
ments of the mesmerisers, published a work on
1843, entitled 'Neurypnology, or the Ratio
Nervous Sleep.' Since this time various pub
have appeared, and have created a general int
subject. One of the most recent productions o
is a series of letters in the 'Athenæum' from
neau, who attributes the cure from a long-standi
the influence of animal magnetism.

The phenomena presented by persons under
of animal magnetism are various, as well as th
which the phenomena are produced. Mesmer
lowers on the Continent, and most of those who h
mesmerism in this country, have produced it
placing themselves near to the individual to be
and making downward passes with their hands ove
without touching them, but looking at them at t
intently in the face. This is found to affect the i
space of time varying from two or three minut
hour. All persons are not however susceptibl
fluence, and if an effect is not produced in the c
an hour, the effort is abandoned. Mr. Braid ho
course of his inquiries, found that a second indiv
necessary to the successful development of mes
mena, and that by causing a person to sit still
directing his attention, by means of the eyesi
particular object, as a lancet-case or a cork, all
the passes and intense looking of the operator c
duced. This induced him to give another name,
to the state in which persons are thus placed.

The effects of the passes or fixed attention
nervous susceptibility are various. Writers on
netism distinguish many stages. The following
is by Kluge, a German writer on the subject,
tolerably correct estimate of the effects which h
served in mesmerised individuals:—

First degree:—Called *waking*, presents no

. The intellect and the senses still retain
rs and susceptibility.

:—Half-sleep, or imperfect crisis. Most of
remain in a state of activity, that of vision
aired, the eye withdrawing itself from the
ll.

:—The magnetic or mesmeric sleep. The or-
es refuse to perform their respective functions,
is in an unconscious state.

:—The perfect crisis, or simple somnambulism.
e patient is said to 'wake within himself,' and
s returns. He is in a state which can neither
ng nor waking, but which appears to be some-
he two.

—Lucidity, or lucid vision. This is called in
tly in this country, *Clairvoyance;* in Germany,
this state the patient is said to obtain a clear
is own internal mental and bodily state, is en-
ite with accuracy the phenomena of disease
rally and inevitably occur, and to determine
ost appropriate and effectual remedies. He
ossess the same faculty of internal inspection
ther persons who have been placed in mes-
i (*en rapport*) with him.

—Universal lucidity; in German, *Allgemeine*
his state the lucid vision becomes greatly in-
ends to objects whether near or at a distance.
tates of the system recognised by mesmerists,
he subject abound with cases illustrative of
x degrees. However, there are many who
sm who are sceptical with regard to the real
two last degrees, although such cases are re-
st authorities on animal magnetism.

st singular statements with regard to mes-
lication to phrenology. It is asserted that
leep-waking state, when that region of the
r pointed at by the mesmeriser which is over
upposed phrenological organs in the brain,
nental emotions and states which are peculiar
of these organs. Thus when the organ of
ed, the patient talks; when wit, he laughs;
e, he is kind, and so forth. Such cases the
Elliotson, Mr. Braid, Mr. James Simpson,

state has been applied mostly to the cure of
i purpose it was used by Mesmer when it
blic attention. It has also been used for the
ing sleep during surgical operations, as well
vination for the purpose of ascertaining past
, as related in the case of Miss Martineau's
e class of diseases which have been cured
those which are known to medical men as
s diseases. Various nervous diseases, such
epsy, &c., come on from changes in the
us organs, but these are not susceptible of
mesmeric state. It is in those cases where
n can be supposed to exist, and which often
changes of the mind from various causes of
hich frequently cease without obvious cause,
to this remedy. To this class of cases be-
ss Martineau, to which we have before al-
een relieved of her nervous symptoms by
t an organic disease still exists. (*Report of*
s H. M., by Mr. Greenhow.) In the
ULISM, P. C., a case is given in which an
formed during sleep artificially induced, and
imilar kind have been recently recorded.

have been propounded in order to embrace
l magnetism. Mesmer and his immediate
d them to the action of a subtle fluid in the
which enabled them to exercise an influence
a distance, just as a magnet affects iron;
t animal magnetism. This hypothesis of a
ptible of being influenced and producing an
less modified, has been adopted by most
erism till the appearance of Mr. Braid's ex-
mesmeric state having been produced by Mr.
influence from a second person, he accounts
a by supposing that there is 'a derange-
ro-spinal centres and of the circulatory and
uscular systems, induced by a fixed state,
of body, fixed attention, and suppressed
nitant with that fixity of attention.' He further adds, that in all cases he believes 'that the whole depended on the physical and psychical condition of the patient, arising from the causes referred to, and not at all on the volition or passes of the operator throwing out a magnetic fluid or exciting into activity some mystical universal fluid or medium.'

Whilst there can be little doubt with regard to many of the facts recorded on this subject, they have been so remarkably misrepresented through the feeling of those who have observed and narrated them, that men of science, disgusted with the imposture of some and the credulity of others, have generally shunned its investigation and turned a deaf ear to what they consider the pretensions of its professors. There have been however recently recorded several instances in which mesmeric cases have been tested by unprejudiced observers, and which have led to the conclusion that in these particular cases either imposition was practised or a false conclusion had been drawn from the facts. In the case of two girls put to the test by Mr. Wakley, editor of the 'Lancet,' and recorded in that periodical for September 1, 1838, there was strong reason to believe that many of the phenomena attributed to animal magnetism were assumed at the volition of the patient. A more recent instance is recorded by Dr. John Forbes, in the same journal, for August 3, 1844, in which he tested the powers of *clairvoyance* of a French youth named Alexis. In these experiments, which were conducted before many observers, the youth entirely failed to give evidence of any extraordinary mental powers during the mesmeric state. Dr. Forbes says in his introductory remarks to his account of the experiments, 'I think it necessary to repeat here what I have stated in the notes, that mesmerism may be true, while its professors are false; that negative results must of course give way to positive ones; and that I for one am still unconvinced that *clairvoyance* has not existed, and does not exist, merely because Alexis on these occasions failed to show it.' Independent of the motive of gain which actuates some, it is admitted by mesmerists that the class of persons who are most susceptible of the influence are 'so much infected with a disposition to deceive, that as yet it is exceedingly difficult to say when, or upon what occasion, their statements are to be relied on.'

In this article we have avoided expressing an opinion, and have given only an outline of the present position of animal magnetism in this country.

(For further inquiry refer to the works quoted, and to Elliotson, *Human Physiology*, 5th edition; Lang, *Mesmerism, its History, Phenomena, and Practice;* the *Athenæum* for December, 1844; and the *Zooist*, a monthly journal which advocates animal magnetism.)

ANIMAL PHYSIOLOGY. [PHYSIOLOGY, P. C.]

ANIMAL STRENGTH. Efforts were made to express the amount of human and animal labour as early as the latter end of the seventeenth century; for, besides Borelli's treatise 'De Motu Animalium,' which was published in 1680, in the 'Mémoires de l'Académie des Sciences' for 1699, there is a paper by M. de la Hire, and, for 1703, one by Amontons, each containing observations and the results of experiments on the strength exerted by men and horses. Since those times the subject has been much studied: Daniel Bernoulli and Euler have treated it scientifically, while Desaguliers, Emerson, Smeaton, and many other mechanicians have made numerous experiments for the purpose of determining the most advantageous manner in which both human and animal strength may be employed. But to none is this branch of mechanical philosophy so much indebted as to Coulomb, who, besides obtaining more correct results from experiments made by himself and others, adopted for the expression of strength a dynamical unit by which its different degrees can be readily compared with one another. He was also the first to make a distinction between the absolute measure of strength and that which may be called the useful effect, that is to say, the part which is independent of the action expended in carrying the man or animal forward. The whole of this subject is of the highest importance, since, notwithstanding the vast use of machinery in the performance of labour, the employment of men and animals is still to an immense extent indispensable for that purpose; and consequently it is very necessary to ascertain what is the greatest quantity of useful work which may be obtained from such agents without subjecting them to a degree of fatigue which might, in time, prove injurious to their health or bodily powers.

The unit employed by Coulomb is one kilogramme (=2·2065 pounds avoirdupoise), supposed to be transported to a distance equal to one kilometre (=3280·9 feet, or 0·6214 miles English); and his expression for strength is, therefore, the product of the number of kilogrammes by the number of kilometres in the distance to which the burthen is conveyed during one working day. Other mathematicians take, for the dynamical unit, the weight of a cubic metre of water conveyed one metre: neither of these units is, however, convenient for persons among whom those weights and measures are not used; and therefore, in this article, the results of experiments have been made to correspond to a unit expressed by one pound (avoirdu.) conveyed one mile; every number expressing strength is, therefore, the product of the number of pounds by the number of miles to which it is conveyed in a day.

With respect to men, Coulomb found that when a man travels unloaded on level ground, he can walk 31 miles daily. Now, assuming the weight of a man to be 160 pounds, we have 160 × 31, or 4960, for the measure of his strength, or the quantity of action; which is consequently equivalent to that of a machine capable of carrying 4960 lbs. to a distance of one mile, or one pound to a distance of 4960 miles in one day.

He found also, from a mean of the work done by the porters of Paris, that with a burthen equal to 128 lbs. a man can walk 9·72 miles in a day; from which it follows (the weight of a man being 160 lbs.) that the quantity of action is (160 + 128) × 9·72, or 2799. If the weight of the man be not included, the quantity of action is 128 × 9·72, or 1244; and this is to be considered as the useful effect. Subtracting 2799 from 4960, we have 2161 for the measure of the action lost in consequence of the burthen; but the useful effect, which in the first case was nothing, is in the second expressed by 1244.

Now, if f represent the burthen which would prevent a man, or animal, from moving, and v the velocity with which he would move if unloaded; also, if f' be the burthen due to a velocity expressed by v'; we should have, according to Euler,

$$f : f' :: (v-0)^2 : (v-v')^2$$

or

$$f'v^2 = f\,(v-v')^2:$$

making therefore $f'=128$, $v=31$, $v'=9{\cdot}72$, as in the example above, we have 272 nearly for the value of f, or the greatest burthen, in pounds, which a man supposed to be of average strength can carry, and under which he could not move.

From the equation above we have

$$f'v' = v\left(-\frac{f'^{\frac{3}{2}}}{f^{\frac{1}{2}}}+f'\right)$$

therefore, in order to find the maximum value of $f'v'$, we may make the differential of the second member equal to zero (f' being the variable), which will give $f' = \frac{4}{9}f$, or 121 lbs. This is the weight which should be placed on a man's shoulders, when it is required to produce from his labour the greatest quantity of useful effect. Making $f' = 121$, $f = 272$, and $v = 31$, in the above equation, we obtain $v' = \frac{1}{3}v$, or $v' = 10\frac{1}{3}$ miles, nearly, for the distance to which the burthen f' could be carried in one day; and $f'v'$, the quantity of action, is 1280.

Coulomb further determined that when a man ascends a convenient flight of steps unloaded, the vertical heights of all the ascents during one day being added together, were equal to 1·82 miles; the quantity of action may therefore be expressed by 160 × 1·82, or 291; as if the action were equivalent to that of a machine which could raise 291 lbs. to the height of one mile vertically, or one pound to the height of 291 miles during a day. When loaded with 150 lbs., the vertical height ascended was 0·494 miles: the whole quantity of action is, therefore, in this case (160 + 150) × 0·494, or 153, while the useful effect is 150 × 0·494, or 74; that is, 74 pounds raised one mile vertically.

It is remarkable that, from the result of Coulomb's experiments on the power of men ascending steps, both the greatest weight which a man can carry without moving, and the weight which he should bear to render his useful effect a maximum, are nearly the same in this case as they were found to be from experiments made with burthens carried on level ground.

Coulomb has also made experiments to determine the quantity of action in the case which most generally occurs when heavy goods are carried in towns, viz. that in which a porter, having delivered his burthen, returns unloaded for another; and his conclusion is, that, in order to produce the most useful effect in this case, the greatest burthen which a man should carry on level ground is 135 lbs.; and with this he should walk 7 miles. The quantity of useful action is 135 × 7, or 945.

It is said that a London porter can carry 200 lbs shoulders at the rate of three miles per hour: but this can only be continued during a short time.

The following statements of the strength of men from Hachette's '*Traité des Machines*,' and from other the numerical values being reduced so as to express the ber of pounds carried by a man one mile per day hours:—

Drawing a vessel on a canal 75
Conveying a load (110 lbs.) in a wheel-barrow (1·018 miles per hour) . . . . .
Drawing a small waggon on four wheels over unequal ground . . . . . .
Pulling horizontally, the weight being raised by a rope passing over a pulley . . . .
Rowing in a boat . . . . . .
Thrusting horizontally, as at a capstan . .
Turning a winch and axle . . . .
Digging with a spade . . . . .
A soldier marching (12·43 miles) with his arms, &c. (60 lbs.) daily . . . . . .

With respect to the horse, the most useful way of ing his strength is to make him draw loads in a cart gon; but, even for such work, the estimates which have made of the quantity of action performed daily are M. Hachette expresses the whole quantity of the cart-horse, by terms equivalent to 309 lbs. drawn miles in a day; and consequently such action should sented by 309 × 25, or 7725. But, according to horse can only draw 125 lbs. at the rate of $2\frac{1}{2}$ miles which, for one day, would give 125 × $2\frac{1}{2}$ × 8, or .
The useful effect of a horse when walking in a circle, as in some mills, is considered as equivalent to .
A horse carrying a soldier with arms, &c. (= 200 lbs.) can go 25 miles in a day, which gives . .
An African dromedary carrying only his rider (160 lbs.), can go between 7 and 8 miles per hour during 9 or 10 hours; which gives 160 × $7\frac{1}{2}$ × $9\frac{1}{2}$, or . . . . .
An Asiatic camel will carry burthens weighing from 500 to 800 lbs. (suppose 600) at the rate of 2 miles per hour. This, for a day of 8 hours, gives 600 × $2\frac{1}{2}$ × 8, or . . . . . .

The velocity of a horse in walking is estimated per second, or $3\frac{3}{4}$ miles per hour. In trotting, 12 second, or $8\frac{1}{3}$ miles per hour; and in galloping, 18 second, or $12\frac{1}{4}$ miles per hour.

For drawing on a road, the traces of a horse should pendicular to the collar on his breast and shoulders, when he leans forward, in pulling, the traces may parallel to the road; and the height of the wheels determined accordingly. When, in drawing a two carriage, a horse has to overcome an obstacle on the he lifts up his fore-feet, and allows his weight to hinder feet as fulcra, till the wheels have passed pediment. It follows, that a certain portion of the a cart should be thrown on the back of the horse, increase the power which the animal employs in an obstacle; and, in ordinary circumstances, it rend siderable inclination forward unnecessary.

When a horse is employed to turn a mill, the he describes should be the greatest possible, 25 or diameter, both to diminish the centrifugal force, and sity which the animal is under of reclining from position in drawing.

ANIMAL TISSUES. [Tissues, P. C. S.]

ANKOBAR. [Abyssinia, P. C. S.]

ANNOTTO. [Arnotto, P. C.]

ANNUITIES AND ASSURANCES. We the most recent information on the subject to what said in Reversions, P. C.

The completion of Mr. Jones's work on Annuit Library of Useful Knowledge, has given compute mense mass of tables, involving all that can be neces as two lives are concerned. Barrett's method, in applied to two lives, for various rates of interest.

The 'Life Assurance and Annuity Tables,' by Sang, Edinburgh, 1841, folio, though confined to Carlisle Table, and 3 per cent., is in every point remarkable work. It contains the present values

ediate means of finding them, for every variety
l assurance on one life, whether for the whole
d term, whether immediate or deferred, with
ery policy at every stage, and a great mass of
s those for increasing or diminishing premiums,
esult has its logarithm by its side. The author
ables himself in type, taking precautions to in-
which appear to have met with full success.
ience of the Amicable Society for 33 years, end-
1841, was printed in quarto (for distribution
ers of the corporation) by the directors at the
ear, under the superintendance of the registrar,
y. Of some of the details of this investigation
ently speak. In 1843 was printed, for the use of
which contributed materials, 'Tables exhibiting
lortality deduced from the combined experience
Life Assurance Offices, embracing 83,905 po-
ch 40,616 are distinguished by denoting the sex
sured, and by classing them into Town, Coun-
Assurances,' quarto. This table was in agita-
ction from the year 1838, and was superintended
e of actuaries, consisting of Messrs. Ansell, G.
nes, Gompertz, Kirkpatrick, Milne, Rainbow,
se. The results of this undertaking, excellent
tion and execution, are accessible to computers
A series of Tables of Annuities and Assurances
n a new rate of mortality amongst assured lives,'
es, London, 1843, 8vo. The early history of the subject has been well given, and reference to authorities facilitated, by Mr. Edwin J. Farren, in an 'Historical Essay on the Rise and Early Progress of the Doctrine of Life Contingencies in England,' London, 1844.

The *actuaries' table* (as it ought to be called) contains the experience of the Amicable and Equitable societies, which had been previously printed, and which afforded conjointly a large majority of the policies employed. We give a summary of results, namely, the duration of life among 100 persons at quinquennial periods of age.

In the following table, columns C. and E contain the Carlisle and Equitable tables [MORTALITY, P.C.]: A. is the Amicable table above noticed. All on the right of the double line comes from the actuaries' tables: in which the data are divided, as far as was practicable, into policies effected in town (London), in the country (other parts of Britain), and in Ireland. The first table, M. T. C. I., is that of males only, town, country, and Irish; F. T. C. I. the same for females; the remaining tables contain both male and female lives, T. town, C. country, I. Irish, C. T. combined town (which is explained to be the *total* experience of the Equitable and Amicable combined with the *town* experience from other quarters, the reason of which we do not see); G. I. the result of all the materials, including the Irish; G. the same not including the Irish. Thus 100 individuals at 35 years of age have among them 3100 years of life according to the Carlisle table, and 3055 according to the general result of the actuaries.

C.	E.	A.	M. T. C. I.	F. T. C. I.	M. F. T.	M. F. C.	M. F. I.	M. F. C. T.	M. F. G. I.	M. F. G.
4146	4167	..	3984	3586	4122	4033	3495	4155	4097	4149
3786	3812	3781	3663	3441	3856	3755	3194	3826	3784	3798
3434	3453	3368	3317	3173	3484	3420	2971	3454	3425	3443
3100	3093	2972	2952	2907	3112	3078	2630	3077	3055	3087
2761	2740	2594	2606	2636	2753	2738	2336	2720	2707	2728
2446	2387	2237	2263	2321	2408	2383	2030	2361	2355	2369
2111	2036	1899	1941	2005	2058	2048	1776	2007	2011	2018
1758	1699	1583	1621	1678	1725	1696	1504	1676	1683	1686
1454	1391	1288	1347	1378	1423	1403	1267	1368	1381	1377
1179	1113	1026	1087	1060	1118	1144	1019	1086	1103	1097
918	870	811	834	793	851	848	792	844	850	854
701	661	634	603	537	629	555	597	645	646	648

s present that general agreement with the Car-
ch the Equitable experience first showed. It
e town-insured have a very little more life than
ot more perhaps than can be very well explained
difficulty of making good selection through an
esult of the Irish lives is startling: it is not cre-
he middle classes of life, an Irishman of thirty
ld have five years less life in him than an Eng-
e same age: the necessary inference is, that the
ce Irish business without sufficient precautions.
of the Carlisle table seems a little too high: but
difference were serious, the offices should of
heir own experience, yet it does not follow that
e better represents the state of life among the
Probably those who sell or surrender their
e strongest and the healthiest; those who have
that ill health is close at hand prefer to re-

that male *insured* life is slightly better than
e whole; which is contrary to all else that is
he relative values of the two. Perhaps female
frequently than male ones, insured from fear of
ymptoms or hereditary tendencies. A man in-
ither for his family or to obtain an advance of
pprehension of speedy death has nothing to do
sition to insure in either case; a woman has,
so many reasons, independently of forebodings,
here is then probably a large proportion among
e friends who insure their lives) of those undis-
s in which parties insuring have reason to know
e state of the life insured than their medical at-
o causes of death which are not likely to act
not much like being forced upon an explanation
es something like concealment in so large a num-
able persons; but some reason there must be for the fact of female insured life contradicting the usual law, namely, that, except only where their occupations are above their strength, as when employed in agriculture, women live longer than men. But it should also be remembered that there may be much due to mere casualty in the earlier parts of the above tables: there are but few policies granted to lives under thirty compared with higher ages.

The actuaries have also made from the tables of the Equitable Society an interesting investigation into the effect of selection. It is naturally to be presumed that the general experience of an office, say after 50 years of age, will not be the same as if the table were made from those who come in at the age of 50, and are then of course reputed good lives. The following is a summary of results on the point, the ages at which the parties were admitted being at the head of the column. The tabular numbers, as before, represent the number of years lived by 100 persons.

Age.	Admitted between			
	25-34.	35-44.	45-54.	55-64.
25	3695	..	..	..
30	3296	..	..	..
35	2910	3098	..	..
40	2549	2737	..	..
45	2195	2369	2419	..
50	1856	2011	2026	..
55	1533	1680	1703	1775
60	1250	1367	1393	1436
65	1015	1079	1113	1168
70	778	848	883	862
75	515	690	673	636

It thus appears that the effect of selection is most decided in young lives, and that if apparently healthy lives were substituted, in a mass of persons in all conditions of health, in the place of those who would be refused by an insurance office, the result would not add more than two years of life to each case, at any age from 35 upwards.

ANNULA'RIA (Sternberg), a genus of fossil plants with leaves in whorls, from the coal formations of Europe and America.

ANOMALI'NA (D'Orb.), one of the many genera of Foraminifera [Fossil, P. C. S.] which occur in tertiary strata.

ANOMO'PTERIS (Brongniart), a fossil genus of Ferns, found in the bunter sandstein of Sulzbad.

ANSWER. [Pleading, P. C.]

A'NTHEMIS NO'BILIS (Common or Roman Chamomile)—*Medical Properties of.* This is an indigenous plant, frequent on our commons; but the flowers used in medicine are generally obtained from cultivated plants. Of these there are two kinds, the single or semi-double, and the perfectly double. The doubling of the flowers is attended with a lessening of their virtues, as the single are more aromatic, and contain more volatile oil, which resides in the yellow tubular florets of the disk. Their excellence may be determined by the beautiful whiteness of the radiant florets, the yellowness of those of the disk, and the strength of the aroma and taste.

Those which are brown, mouldy, and faintly smelling, should be rejected. They contain a volatile oil of a beautiful blue colour, camphor? a gum resinous principle, and a small quantity of tannin.

The difference both of taste and smell, the diversity of the oil, and the absence of the camphor-like principle, show the impropriety of substituting for the Anthemis the flowers of the Matricarica Chamomilla (or Feverfew). In this genus the receptacle is naked, in the Anthemis it is paleaceous,—besides, the flowers are similar, and of an unpleasant smell. The flowers should be gathered before they fully expand. The forms of exhibition are, powder, infusion, extract, and oil.

Chamomile is an excellent bitter and tonic agent. Given in powder, or pill, or extract, with addition of a few drops of the oil, it is of great service in dyspepsia, atonic gout, and in intermittent fevers. The infusion may be made the vehicle for alkalies or acids.

The infusion when tepid is emetic, and may be given beneficially in dyspepsia, and at the commencement of catarrh, (particularly influenza,) and hooping-cough.

The decoction is an objectionable form, as it dissipates the oil. Even the infusion should be made with cold water. A most grateful aperient for weak dyspeptic patients is made by steeping senna leaves, chamomile flowers, and a very few cardamoms for ten hours in cold water, straining, and adding to the infusion any saline medicine required. The extract possesses valuable tonic properties, but in preparing it the volatile oil is dissipated, which deprives it of aroma. This may be restored to it by adding a few drops of the volatile oil. Extract of chamomile, with sulphate of quinine, and the volatile oil, furnishes a combination of immense power in improving the appetite and aiding the digestion in convalescences from acute diseases, or after an attack of gout.

Infusion of chamomile, either warm or cold, furnishes an excellent application to weak eyes, or after exposure to the wind in travelling, especially by railroads. This used early will often ward off inflammation.

A'NTHEMIS (or ANACYCLUS) PYRETHRUM—*Medical Properties of.* Pellitory of Spain grows in the south of Europe, north of Africa, and in Syria, but the root of another variety, Pyrethrum, Willd., native of Germany, is also met with. The first is called the Roman or true Pellitory, the latter the German: this is necessary to be known, as the chemical analysis varies considerably. Gautier seems to have analyzed the Roman, and found it to contain—

An acrid fixed oil (resin)	5
Volatile oil (a trace)	
Yellow extractive	14
Gum	11
Inulin	33
Muriate of lime (a trace)	
Woody matter	35
Loss	2
	100

It is devoid of smell, and though it does not at first excite any sensation in the mouth, it is followed by a pung
flow of saliva.

Its use is confined to local affections of the m
subinflammatory or paralytic. In rigidity of t
the jaw, or rheumatic pains, from exposure to c
chewing this is often of great service. An
be held in the mouth, also in toothache from cold
may be formed of it, which would be a useful
lysis of the stomach, added to the infusion.

ANTHE'MIUS ('Ανθέμιος), a distinguish
tician and architect of the sixth century. He
called Anthemius Trallianus, from his birthpla
Lydia. Alexander Trallianus the celebrated
the brother of Anthemius, and he had three other
distinguished themselves, according to Agathias,
was the most distinguished of the architects
Justinian at Constantinople; he began to rebui
of St. Sophia, after it was destroyed by the
531, and it was completed after his designs by
Miletus, after the death of Anthemius, which
taken place in the year 534. The church was
until 537, but the dome fell in twenty years afterw
the shock of an earthquake; it was however again
dorus, and the dome then raised was the first
built upon arches and piers, and still remains; it
diameter, and is built of stone.

The mechanical genius of Anthemius is praised
and he must have been distinguished also as a m
as Eutocius has addressed to him his commen
Conica of Apollonius Pergaeus. Halley publis
of these conic sections, Greek and Latin, with
taries of Eutocius, at Oxford in 1710. M. Du
in 1777, at Paris, a fragment of a work by Ant
chanical paradoxes: Περὶ Παραδόξων Μηχανημ
French translation, and notes, entitled 'Fragm
vrage Grec d'Anthemius sur des Paradoxes de

(Procopius, *De Aedificiis Justiniani*, l. i.
Sanctae Sophiae;' Agathias, *Hist.* l. v.)

ANTHIA'NUS, FU'RIUS, a Roman, fro
on the Edict, 'Ad Edictum,' there are thre
the Digest. [Justinian's Legislation, P. C.
which Anthianus lived is unknown.

ANTHOLITHES (Brongniart). Some fos
designated occur in the coal formations of S
Northumberland.

ANTHOPHYLLUM (Schweigger), a fo
Madrephylliœa, P. C.

ANTHOSPE'RMEÆ (from ἄνθος, flower,
seed), a tribe of plants resembling Anthosperm
ber-tree), belonging to the natural order Cin
consists of the genera Coprosma, Phyllis, Galopi
and Anthospermum. They possess diœcious o
dite flowers; a rotate corolla; styles separating
ending in an elongated hispid or plumose stig
consists of 2 indehiscent 1-seeded mericarps, or
bumen of the seed is fleshy. The species are s
shrubs, with opposite or verticillate leaves, a
toothed stipules, which are adnate to both sid
tioles.

None of the species are used in the arts or
tribe is however interesting as forming a link be
posite-leaved Cinchonaceæ and the verticilla
Although most of the Anthospermeæ have oppo
several species of Anthospermum itself, as A. B
A. Æthiopicum, have their leaves subverticillat
the leaves occur in whorls of three or four. T
but a single species, known by the common na
Hare's-ear. It may be cultivated, with other
tribe, in a mixture of loam, peat, and sand.

ANTHRACOTHE'RIUM (Cuvier), a fo
Pachyderm mammals, of which many species oc
deposits, especially in the gypseous and lignitic
and Tuscany.

ANTICLI'NAL, a term in geology which
fact that, from a given line, the strata dip in o
tions.

ANTIDICOMARIANITES (from the two
ἀντίδικος, *adversary*, and Μαρία, *Mary*), a sec
heretics, whose peculiar belief was that Mary
our Saviour did not continue a virgin after his
Roman Catholic Church asserts that she did to
life, but bore other children to her husband J
doctrine seems to be countenanced, not only b

e, but by the statement of St. Matthew, that
his wife till she had brought forth her first-
:he mention in various passages of the Gospels
ıd sisters of Jesus. (But see what is said as
' the expression, 'the brother of Jesus,' under
ɪᴇ Eᴘɪsᴛʟᴇ ᴏғ, P. C., vol. xiii. p. 77.) The
preachers of Antidicomarianitism were Hel-
an, two Roman theologians of the latter part
tury, the latter of whom is also charged with
:resies. The original accounts of Helvidius
ıd of their opinions, are to be found in the
ustine, Jerome, and Epiphanius, who were
ries.

O is a small island opposite the north-western
ıd of Milo, the antient Melos, in the Archi-
ɪut five miles from the harbour of Milo, and
little to the north-west, so that the main sea
om the harbour. At the distance of twenty
ıppears to be a round mountain rising out of
oming nearer, a peak is observed in the centre
ities forming several small capes, between
ays.

cription des Isles de l'Archipel, p. 361.)

R, LUCIUS CAELIUS. [Cᴏᴇʟɪᴜs, P. C.]

S, (Ἀντίφιλος) a celebrated Greek painter,
pt in the time of Ptolemy Philopator, at the
century ʙ.ᴄ. He is praised by Quintilian
ith which he painted, and Pliny mentions
ks, in various styles. He painted—Hesione;
, and Minerva; Bacchus; Alexander as a
us and Europa; also Hippolytus and his
by the sea-monster sent against him by
rehensive and difficult subject: these were
iny's time. Pliny also mentions the follow-
ıunting; a boy blowing a fire with its
s face and the surrounding objects; a room
ning and weaving; and a Satyr looking out
with his hand over his eyes, and a panther's
his shoulder: the last was a very celebrated
own as the ἀποσκοπεύων, or Looker-out. Be-
ctures, Antiphilus was the inventor of a kind
led *Grylli*. They were a species of gro-
art man and part animal or bird, of which
omans appear to have been fond. Antiphi-
ed variety of style to facility of execution.
f Egypt, and his time is fixed by a circum-
ith him mentioned by Lucian in his treatise
Some writers have inferred that he lived
lip and Alexander from the manner in which
s him, and because Pliny states that he painted
t their pictures are not noticed as portraits, but
s, and which may have been painted at any
. Quintilian speaks of Antiphilus as one of
ho were distinguished during the time of
is successors, but he speaks vaguely; Pto-
however, though the fourth of the Ptole-
ictly spoken of as one of the successors of
e circumstance related by Lucian shows a
character of Antiphilus. Being jealous of a
e of Apelles, a citizen of Ephesus, who was
t the court of Ptolemy, Antiphilus accused
rticipator in the conspiracy of Theodotus at
s was Egyptian governor of Cœle-Syria, and
k place, according to Polybius, in 218 ʙ.ᴄ.
lieved the accusation, and Apelles was appa-
, but upon his innocence being established,
d him with 100 talents, and condemned
his slave, a part of the indemnification
the painter would not be disposed to put
s was however not satisfied with the hand-
Ptolemy, and when he returned to Ephesus
intelligible allegory of Calumny, in which
ing acted a very ridiculous part—he was
g upon a throne, with the ears of Midas,
istening to Suspicion and Ignorance; Ca-
aching him dragging a youth by the hair;
d by Envy and followed by Deceit and
background were Repentance and Truth.
evidently bad; the subject is inapplicable;
oses a thorough knowledge of iconology, or
ification, in the spectator. Alessandro Bot-
icture from Lucian's description, but it has the mere effect of a theatrical representation; it is impossible to trace calumny in it: it is in the Imperial Gallery at Florence. The Apelles here mentioned must not be confounded with the celebrated Apelles of Cos: Lucian expressly calls him Apelles of Ephesus; in other passages where he speaks of Apelles of Cos, he says simply Apelles.

(Lucian, *De Calumniâ*; Pliny, *Hist. Nat.* xxxv. 37, 40; Quintilian, *Inst. Orator.* xii. 10, 3.)

ANTIRRHI'NUM, a genus of plants belonging to the natural order Scrophulariaceæ. This genus is the type of a section of the order to which also the genera Linaria, Anarrhinum, Maurandia, Galvesia, Lophospermum, and Rhodochiton belong. It is characterised by a 5-parted oblique calyx; a personate corolla, gibbous at the base, but with no distinct spur; the lobes of the upper lip erect, those of the lower spreading, 3-fid, with the middle segment smallest, and a bearded palate which closes the mouth; the capsule 2-celled, opening by two or three pores at the top; seeds oblong, minute, with black testa. The species are annual or perennial, rarely shrubby. The leaves are feather-veined, and entire, opposite below, and usually alternate above. Two of the species are indigenous to Great Britain. All of them produce showy flowers, and are much cultivated in gardens. Their medicinal properties are not very active.

A. majus, Great or Common Snapdragon, has lanceolate, opposite or alternate glabrous leaves, racemose flowers, ovate obtuse sepals, much shorter than the corolla, and the upper lip bifid. This plant attains a height of one or two feet, and has purplish-red or white flowers. It is found in Great Britain on old walls and chalk cliffs, especially in the neighbourhood of London, but it is undoubtedly a naturalised plant, being truly indigenous in the south of Europe and the north of Africa. In gardens a variety is often seen with double flowers. The leaves are bitter and slightly stimulant. 'Gmelin says that in Persia an excellent oil equal to that of the olive is procured by expression of the seeds of *A. majus*; and Vogel observes that the common people in many countries attribute some supernatural influence to this plant, believing it to have the power of destroying charms, and rendering maledictions of none effect.' (Burnett.)

A. Orontium, Orontium Snapdragon or Calves'-snout, has linear-lanceolate opposite or alternate leaves; the flowers loosely spiked, distant; the sepals linear and longer than the corolla. This plant appears to be truly indigenous in England and Ireland, where it occurs in dry sandy and gravelly soils. It is also a native throughout Europe, in the islands of the Mediterranean, and the north of Africa. It has been found in Virginia, but it has been probably introduced. Its leaves as well as those of other species have been used as cataplasms in indolent tumors.

Don enumerates twelve other species, many of which have been introduced into our gardens. They are pretty border-flowers, and adapted for rock-work. They are easily cultivated, and the perennial species may be increased by cuttings, and the annual raised by seeds. The species from subtropical districts will however require a frame or the greenhouse in the winter.

(Babington, *Manual of British Botany*; Don, *Gardener's Dictionary*.)

ANTONELLO DA MESSI'NA, a celebrated Italian painter, distinguished as the first Italian who painted *in oils*, as it is termed. Neither his name nor any date connected with events of his life are exactly known. He was born at Messina about the year 1414, and was instructed in painting by his father Salvatore d'Antonio; he then studied in Rome, and returned to Messina an accomplished painter for his time, and acquired considerable reputation by some works which he executed at Messina and at Palermo. In about the year 1442 he had occasion to visit Naples, where, in the possession of the king, Alfonso I., he saw a picture executed in a manner and with materials quite new to him: this was a picture of the Annunciation by Giovanni da Bruggia, as Vasari names John Van Eyck. Antonello no sooner saw this picture than he was possessed with an invincible desire to learn by what means it was painted; and having learnt the name and place of residence of the painter, he immediately set out for Flanders, where by means of presents of Italian drawings and other works of the kind he was not long in obtaining Van Eyck's secret. Antonello seems to have remained with Van Eyck until his death in 1445, when Antonello returned to Sicily for a few years; but before 1450 he was in Venice, by which time he had communicated the new method to Domenico Veneziano, who was murdered in Florence in 1464, by Andrea del Castagno, after he had obtained the secret of the new method from him. From Venice Antonello repaired to Milan, where he probably dwelt some years, and about the year 1470 he returned to and established himself at Venice. In Venice he lived upwards of 20 years in the enjoyment of the reputation of one of the most distinguished painters of his age. He died aged 79, probably in 1493, just as he was about to execute some works for the palace of the Signory of Venice. Vasari states that Antonello died aged 49, but from various circumstances this is evidently an error: he probably mistook 79 for 49 in his authority. Domenico was said to have been assassinated when Antonello was 49, which was, as near as can be ascertained, in 1464; if Antonello therefore died aged 79, we have both the dates of his birth and death, 1414 and 1493, and the last date corresponds with the year when the repairs in the palace of the Signory of Venice were completed.

Antonello appears to have made no secret of his new method of painting after his second visit to Venice, for in 1573 Bartolomeo Vivarini painted a picture in the new manner for the church of the SS. Giovanni e Paolo, and Antonello himself marked his pictures *ōō pinxit*. There is at least one so marked in the possession of a gentleman at Utrecht; it represents Christ between the two thieves, and 'Antonellus Messaneus me ōō pinxit, 1475,' is inscribed upon it; it is a small picture painted upon a panel of wild chestnut. The ōō evidently signify oleo, or in oil; a word, however, calculated to mislead, as the method of painting simply *in oil* was very old, and that of Van Eyck was not merely painting in oil; it was, according to Vasari, painting *in varnish*. Vasari says that Van Eyck, by boiling linseed, poppy, and nut oils, with other mixtures, obtained that *varnish* which he in common with every other painter in the world had long desired. From this sentence it is evident that *painting in oil* is strictly a misnomer, and it was adopted only as sufficiently descriptive in contradistinction to the then prevailing method of water-colour or à tempera painting.

Antonello's works were distinguished for tone, for brilliancy of colour, and for the excellence of their impasto, but those which remain are much darkened. In design they are similar to the works of the Bellini. Antonello's life was long, and he was industrious; the extreme scarceness therefore of his works cannot be otherwise accounted for than by supposing them to be attributed to other masters, or vaguely designated as of the school of Van Eyck, a very frequent designation in the continental galleries. There is only one picture by him in Venice—the Virgin reading in the Academy. Boschini (1733) mentions only one—A dead Christ supported by angels, in the chamber of the Council of Ten, which appears to be now in the gallery of Vienna, but how it was removed from Venice is not known; there are three in the gallery of Vienna, and there is or was a head of Christ in Devonshire House, according to Dr. Waagen. At Messina, in 1792, there were still twelve small pictures by Antonello, around an old mosaic of the Madonna, in the monastery of San Gregorio. At Munich, in the gallery of the Duke of Leuchtenberg, there is a portrait by him of Catarina Cornaro, queen of Cyprus.

(Vasari, *Vite de' Pittori*, &c., and Schorn's Notes to his German translation; Puccini, *Memorie Istorico-Critiche di Antonello degli Antoni, Pittore Messinese*, Florence, 1809; De Bast, *Messager des Sciences et des Arts*, Gand, 1824; Boisserée, *Kunstblatt*, 1826; Passavant, *Kunstreise durch England und Belgien*; Lanzi, *Storia Pittorica*, &c., vol. ii.)

APELLEANS, or APELLITES, a sect of heretics so called from their founder Apelles, who lived about the middle of the second century, and had been originally a disciple of Marcion. The belief of the Apelleans appears to have been a variation of that of the Marcionites. They are said to have, as well as the Marcionites, held the Manichæan dogma of the good and evil principles; but what principally marked them was their doctrine upon the subject of the incarnation of Jesus Christ. They said that his body was neither real, as commonly supposed, nor only apparent or shadowy, as Marcion taught; that it was formed not of flesh and blood, but of air, and that, as it had been received in his descent to the earth, so it was cast off and dissolved again into air in his ascent to heaven. Besides thus denying that Christ took his body with him to heaven, they also denied the general doctrine of the resurrection of the body. They are accused moreover of denying the authority of the Old Testament. Apelles and his heresies are mentioned by Augustine, Epiphanius, Tertullian, and Eusebius.

APEREA. [Leporidæ, P. C.]

A'PHYLLUM (*Artis*). [Aspidiaria, P.

APIOCRINI'TES (*Miller*), a fossil genus
found in the oolitic formations and in the chalk.

APLANATIC LENS (from the Greek
πλάνη, *deviation* or *aberration*) is one which sho
of so refracting all the rays which, diverging
verging to any one point in the axis, are inciden
after being transmitted through it they may
diverge from one other point in the same axis.

The spherical forms which are given to t
lenses, and the dispersions of the different co
each pencil of common light, are the causes
any one colour when incident on a lens in the cir
circles at different distances from the axis, an
rays of different colours in any one pencil how
do not converge in one point; and the diffusion
points of convergence about the geometrical fo
is the aberration which it is proposed to correct
sible by giving appropriate forms to the surface
bining together two or more lenses.

Writers on optics show that a curve-line by
tion about an axis there shall be described a
being that of a refracting medium, will cause all
upon it, when they diverge from or converge to o
refracted so as to converge to or diverge from one
most general form, of the fourth order: but wh
point is at an infinite distance from the refracti
when it is at a celestial body, the form of the s
ing the density of the refracting medium to b
that of the medium which surrounds it and in whi
dent rays, is proved to be that of a spheroid; a
on its convexity, parallel to the major axis of
would, within the medium, converge accuratel
most remote from the place of incidence. If
medium were less dense than that in which a
rays, the surface would be that of an hyperboloi
transverse axis both of the spheroid and hyperb
to the excentricity, as the sine of the angle of
the sine of the angle of refraction: in the form
fraction is from the surrounding medium into
and in the latter, from the concave surface of t
into the surrounding medium. It follows the
meniscus lens denser than the surrounding m
anterior surface spheroidal, and its posterior s
sphere whose centre is at the further focus of
since the rays will then suffer no refraction in p
the posterior surface, it will be aplanatic. Als
surface of a medium be plane, so that the parall
perpendicularly on it may suffer no refraction in
the other surface be part of an hyperboloid, t
tween the surfaces being denser than that whic
the plane lens thus formed will be aplanatic;
rays converging to the opposite focus of the hyp

The form of the expression for aberration,
rays are incident on a lens having spherical s
that the aberration cannot be made to vanish
values of the radii of those surfaces unless the i
tion in the medium were equal to or less th
there is in nature no medium which has suc
index; therefore, failing in making spherical
aplanatic, and it having been found impossible, h
them with surfaces produced by the revolution
tions, mathematicians have investigated expre
form under which, with a given refractive ind
tion of the focus shall be a minimum; see the
in the Encyclopædia Metropolitana (art. 305),
between the radii of the surfaces, in this state, i
that ratio it is shown that, when the index of re
the lens should be of the double convex form, ha
of the posterior surface six times as long as that
surface, or that which is nearest to the radiant

For an investigation of the radii of the sur
when two of them are combined together for
diminishing at the same time, as much as pos
chromatic and spherical aberrations, see Tele
and, in the treatise on light above quoted (arts.
John Herschel has given four equations involv
tive indices, and the dispersive powers, of the t
their principal focal distances, from which the
be obtained consistently with the condition that
shall be zero. From the equations, and with d
tive indices, there is computed a table of the rad
for the compound object-glass of a telescope as

e, the compound focal length being 10 inches;
proportions indicated, the radii for object-glasses
r compound focal length may be found. (On
of aplanatic lenses for microscopes, see Micro-
.)

ASIAS. [Metamorphosis, Vegetable, P. C. S.]

IECARIES, COMPANY OF. The alteration
ely to take place in the constitution of the bodies
ith the superintendence of medical education in
y renders it desirable to postpone the notice of one
he Apothecaries' Company. Under another head
, College of, P. C. S.] it is hoped that a com-
may be given of the changes alluded to, as they
robably have been decided upon by the time that
work is reached.

HE'CIA (from the Greek ἀποθήκη, a case, a re-
in Botany, a name given to some of the organs of
in Cryptogamia. In lichens the reproductive
ears on the surface of its frond or thallus in two
st, in the form of little coloured cups or lines with
surrounded by a rim, and containing tubes filled
e; and secondly, in the form of little heaps of pul-
tter, which are scattered over the surface of the
ese last are called *soredia*; the first, *apothecia*.
s form the principal means of distinguishing the
of lichens, and consequently it has been found
indicate minor points in their structure by other
s the apothecium, which in English is called a
rious names according to its form: *Scutellum* is
an elevated rim; *Pelta*, a flat shield; *Tuber-*
x shield; *Trica* or *Gyroma*, a furrowed shield;
ar shield; *Globulus*, a round deciduous shield;
orbicular, hemispherical shield. The parts of
n or shield have also obtained distinct names:
ium is the inside of the shield, in which the
mmersed; *hypothecium* is the substance that sur-
lies the perithecium; *nucleus* is the disk of the
contains the sporules and their cases; and *asci*
in which the sporules are contained.

s also the name given to the cases in which the
roduction of many of the Algæ are contained.
tive granules contained in the apothecia of both
Algæ are called by some writers *gongyli*.

TOR, an officer employed as messenger and in
in ecclesiastical courts. Apparitors, says Burn,
d from that principal branch in their office,
eth in summoning persons to appear.' The
that letters citatory are not to be sent by those
tained them, nor by their messenger, but the
nd them by his own faithful messenger. It is
e apparitor to call defendants into court, and to
commands as the judge may give him, and this
be performed by deputy. In 21 Hen. VIII.
es in the canons, apparitors are also called sum-
nmers. The above act restrains the number of
t by bishops, archdeacons, or their vicars or
er inferior ordinaries.

tors of the ecclesiastical courts are paid by fees,
t cases amount to a very small sum annually.
nts of the apparitor of the Prerogative Court of
e however considerable, and in 1843 amounted

s a Roman word, and was used as a general term
person who was in attendance on public func-
pparebant, whence the name) to execute their
term accordingly includes a great variety of
Roman system. Under the later Empire vari-
s and functionaries had their apparitores, whose
vileges are enumerated in the Justinian Code,
c.

ANCE. [Pleading, P. C.]

TO THE SESSIONS. [Sessions, P. C.]

I'NI, FRANCESCO MARIA, born near Turin
ised at Rome, where he entered the order of
nd was after a time sent to fill the chair of
e college of his order at Ragusa, a town which
ed a close connexion with Italy. He became a
nt in the Slavonian language, and he published
the Illyric language, that is to say, of the Dal-
t of the Slavonian, and several treatises on the
But his principal work concerns the history
l country Ragusa, and it gives a very interesting
at now almost forgotten little state, which governed itself for centuries as a republic, and cultivated the arts and retained the manners of civilized Europe on a narrow nook of land on a barbarous coast, surrounded and yet respected by the Ottoman power: 'Notizie istorico-critiche sulle Antichità, Storia, e Letteratura dei Ragusei,' 2 vols. 4to. 1802-3. In the second volume the author gives notices of those natives of Ragusa who have written works in Italian, Latin, or Slavonian.

When Napoleon took military possession of Ragusa, and subverted that antient republic, as he had subverted the republics of Venice, Genoa, and Lucca in Italy, Appendini was retained as rector of the college of Ragusa. After the Austrians had superseded the French in 1814, Appendini was commissioned by the imperial government to establish a school for teachers at Zara, with the view of providing masters for the various schools of Dalmatia. Consequently he removed from Ragusa to Zara, where, after remaining several years, he died in 1837, and was buried with great honour. He was much regretted both at Zara and Ragusa as a very useful and enlightened educator of youth, in a country which stood particularly in need of such.

(Tipaldo, *Biografia degli Italiani Illustri del Secolo XVIII. e dei Contemporanei.*)

APPIA'NI, ANDRE'A, probably the best fresco painter of the eighteenth century, was born at Milan in 1754. After visiting and studying in the principal cities of Italy, he chose Correggio for his model. From 1795 until 1813, he worked with great applause at Milan: but in the latter year he was compelled to desist from his labours by a stroke of apoplexy; a second attack of which, in 1817 or 1818, caused his death.

Appiani was Napoleon's principal painter in Italy, for which office he received an annual pension of 6000 francs. He was a knight of the Iron Crown, and a member of the Legion of Honour. He however died in poverty, having lost his pension in consequence of the Restoration in 1814.

His principal frescoes are in the church of Santa Maria Vergine, and in the royal palace of Milan; the latter have been engraved by Rosaspina. He was also an excellent painter in oils: there is a portrait of Napoleon by him, which has been engraved by Bartolozzi.

Francesco Appiani, another distinguished fresco painter of the eighteenth century, was born at Ancona in 1702. He was employed by Benedict XIII. at Rome, but he lived chiefly at Perugia, where he continued to paint until his ninetieth year and his death in 1792; a degree of vigour, except in the cases of Spinello Aretino and Titian, perhaps without a parallel. He painted, according to Lanzi, many pictures for England.

(Lamberti, *Descrizione dei Dipinti a buon Fresco eseguiti dal S. A. Appiani*, Milan, 1809; Lanzi, *Storia Pittorica*, &c.)

APPIA'NO, D', an Italian family of the middle ages, which rose to the rank of sovereign princes. Jacopo d'Appiano was, in the latter part of the fourteenth century, the confidential secretary and friend of Pietro Gambacorta, the then chief magistrate of Pisa, who appointed him chancellor of that republic. He conspired however against his benefactor, and had him killed, together with his sons, A.D. 1392. D'Appiano then assumed the title of Lord of Pisa, being supported in his usurpation by Gian Galeazzo Visconti, Duke of Milan, who needed the assistance of Pisa against the Florentines. Jacopo d'Appiano died in 1398, and was succeeded by his son Gherardo, who, mistrusting his own capabilities to retain possession of the power usurped by his father, sold Pisa to the Duke Visconti for 200,000 florins, reserving for himself the sovereignty of Piombino on the sea-coast, and of the island of Elba opposite. He assumed the title of Prince of Piombino, which his descendants retained for two centuries after. When Cosmo I. became grand-duke of Tuscany, he coveted the possession of Piombino, but Jacopo V. d'Appiano, the then prince of that state, in order to escape from annoyance, placed himself under the protection of Charles V. as a feudatory of the empire. His son Jacopo VI. died in 1585, leaving no legitimate offspring; but his natural son Alessandro d'Appiano, who had been legitimated by the emperor, succeeded to the principality on his admitting a Spanish garrison within the town of Piombino. Spain was then the paramount power in Italy. Alessandro was murdered in 1589, with the connivance of his wife Isabella de Mendoça, and of her paramour the Spanish commandant of the garrison. The state of Piombino remained for some time after in the occupation of the Spaniards. In 1619 the Aulic Council adjudged it to the house of Mendoça as being the next heirs, from whom the Italian house of Ludovisi purchased the fief, which afterwards passed by inheritance into the house of Buoncompagni of Rome, who kept it till the French revolutionary invasion. Bonaparte, on his assuming the imperial crown, bestowed the principality of Piombino on his brother-in-law Felix Baciocchi.

(Tronci, *Memorie Istoriche di Pisa;* Botta, *Storia d' Italia.*)

APPOINTMENT. [TRUST AND TRUSTEE, P. C.]

APPORTIONMENT. Apportionment of rent, &c. is a term of law signifying the dividing of a rent, annuity, or other payment recurring at fixed periods, and may be either among several persons entitled to the rent, or between the person entitled to the rent and the person or persons liable to the payment of it.

A rent issuing out of land may be apportioned in two ways; one by granting the reversion of part of the land out of which the rent issues, the other by granting part of the rent to one person and part to another. When rent is reserved upon a lease, and the lessor disposes of part of the lands in reversion, either by will or deed, the rent is apportionable, provided the lessee concur. But the lessee is not bound by any apportionment made without his consent. If the lessor or a stranger recovers any part of the land, or the lessor enters for a forfeiture upon part thereof, or the lessee surrenders a part to the lessor, the rent will be apportioned in respect to the part so recovered or surrendered and the part remaining in the hands of the lessee.

When a lessee aliens a part of the land comprised in his lease, the alienee is liable in an action of covenant for a proportional part of the rent reserved on the lease, the covenant for payment of rent being one which runs with the land; and therefore as respects him there is an apportionment of the rent. The alienation of a part of the lands does not however, any more than an assignment of the whole, discharge the original lessee from his liability upon his express personal covenant for payment of the whole rent. The right of distress for the whole rent upon every part of the land of course remains unaffected by the assignment, unless, as is sometimes done in the case of building leases, the original grantor agrees to restrict his right of distress on the lands aliened to a proportionate part of the rent.

If a man having a rent-charge issuing out of lands, purchases any part of them, the rent-charge is extinct as to the whole; but if part of the land out of which the rent issues descends upon the owner of the rent-charge, the rent will be apportioned. And this will also be the case upon a partition of the lands out of which the rent issues. If a grantee of a rent-charge release all his right in part of the land charged, he extinguishes the whole rent; but if a grantee of a rent-charge release part of the rent to the grantor, the residue will remain charged on the land, for here the grantee deals with the rent only, not with the land. On the principles here stated a difficulty arises on the sale of part of lands subject to a rent-charge. Where the party entitled to the rent is willing to release the land to be sold, the mode sometimes adopted is for the owner of the rent-charge to assign it to a trustee upon trust, to receive it exclusively out of the lands intended to remain charged. Another mode is for the annuitant to join in the conveyance of the lands sold and to add a proviso that the other lands shall continue liable. This plan however is open to the objection that as the proviso operates as a new grant, the rent-charge becomes liable to the incumbrances of the owner of the land created before the conveyance. A third mode, sometimes adopted, is that of the owner of the rent-charge covenanting not to distrain on the lands sold, but it seems doubtful whether such a covenant does not operate as a release of the rent-charge. If the owner of the rent-charge will not concur, the only plan seems to be for the vendor to covenant with the purchaser that the lands not sold shall be exclusively liable, and give an indemnity by demise or otherwise against the rent-charge. It seems that the technical rule of law which is productive of so much inconvenience ought to be altered.

By the common law, if a lessor tenant for life died within the half-year at the end of which rent was due upon a lease not made in execution of a power, and which therefore determined on the death of the tenant for life, the half year's rent could not be apportioned, and was therefore lost both to the representatives of the lessor and to the remainder-man or reversioner, upon whom the lease was not binding.

To remedy this evil it was provided by the stat. 11 Geo. II. c. 19, § 15, that where a lessor tenant for life died before the rent-dav his executors might recover from the
tenant a proportionate part of the rent then
making all just allowances. But as this statute
to apply only to persons strictly tenants for li
application to the case of a lease made by a t
by a tenant in tail under a power, if in either
the lessor died in the interval between two
rent being due, the whole rent went, according
the common law, to the heir or remainder-m
could be no apportionment in favour of the e
law has now been altered by the stat. 4 &
22, the object of which is to apply the princip
apportionment to all property which consist
and fixed money payments.

By the first section it is declared that rent
leases determining on the death of the person
(though not strictly tenant for life), or on th
tenant *pur autre vie*, shall be considered as w
visions of the above-mentioned stat. 11 Ge
§ 15.

By the 2nd section it is enacted that from
the act all rents service reserved on any lease
fee, or for any life interest, or by any lease g
any power (and which leases shall have been
the passing of the act), and all rents-charge an
annuities, pensions, dividends, moduses, com
all other payments of every description in the
dom of Great Britain and Ireland made paya
due at fixed periods under any instrument that
cuted after the passing of the act (or being
mentary instrument) that shall come into oper
passing of the act, shall be apportioned so and i
that on the death of any person interested in
annuities, pensions, dividends, moduses, compos
payments, as aforesaid, or in the estate, fund, off
from or in respect of which the same shall
derived, or on the determination by any other me
of the interest of any such person, he or she,
executors, administrators, or assigns, shall be en
portion of such rents, annuities, pensions, divid
compositions, and other payments, according
which shall have elapsed from the commen
period of payment thereof respectively (as the
including the day of the death of such person
mination of his or her interest, all just allowan
tions in respect of charges on such rents, annu
dividends, moduses, compositions and other p
made; and that every such person, his or her
ministrators, or assigns, should have such and t
dies at law and in equity for recovering suc
parts of the said rents, annuities, pensions,
duses, compositions, and other payments, wh
portions of which such apportioned parts shall
become due and payable, and not before, as h
would have had for recovering and obtaining suc
annuities, pensions, dividends, moduses, com
other payments if entitled thereto, but so that
to pay rents reserved by any lease or demise,
tenements, and hereditaments comprised there
resorted to for such apportioned parts specifical
but the entire rents of which such portions sh
shall be received and recovered by the person
if the act had not passed, would have been e
entire rents; and such portions shall be rec
such person or persons by the parties entitle
under the act in any action or suit at law or
seems doubtful whether the above enactment
the case of an annuity payable at certain periods
able at the death of the grantor, because if the
by the death of the grantor on any day befor
ment, the 'entire portion' can never become
advisable therefore to retain the usual apporti
in the grants of such annuities.

The 3rd and last section provides that the
apply to cases in which it shall be expressly
no apportionment shall take place, nor to ann
payable on policies of assurance of any descripti

Rights of common are apportionable in certai
mon of pasture where it is appendant may b
either where the commoner purchases a part
which he has the right of common, or upon a
part of the land to which the right is appendant
of common of pasture appurtenant, there will
ment in the second case, but not in the first.

2. *Ophiospermum.* Perigone 6-parted, urceolus 10-lobed, stamens 10, anthers adnate, seed furnished with a wing.

3. *Gyrinops.* Perigone tubular, toothless; seed furnished with a spongy, awl-shaped, triquetrous tail.

Of the last two genera little is known. One species of each has been described. There are three species of Aquilaria.

A. Malaccensis, the *Bois d'Aigle*, or Eagle-wood, has ovate, abruptly acuminated leaves. It is a native of Malacca, and produces a whitish yellow wood. This is the A. ovata of some botanists. *A. Agallochum* is a native of the East Indies, where it is called *Ugoor*, or *Ugooroo*, by the natives, and *Lignum-aloes*, or Aloe-wood, by the Europeans. The wood has a fine scent, and is supposed to be the *Calambac*, or *Agallochum*, of the antients.

A. secundaria is another species which also yields a scented wood, and has been known in the Materia Medica, and used in perfumery, under the names of Agallochum, Lignum-aloes, and Aloe-wood. In a healthy state this wood is said to be white and inodorous; but it is subject to the attacks of disease, which causes the secretion of a resinous matter, and the wood then becomes coloured, and gives out a powerful scent. This secretion resembles camphor in many of its properties, and has a bitter flavour: hence the name of the tree. In medicine it is recommended in the same diseases as the fetid resins and volatile oils, and does not seem to possess peculiar properties; so that it is not used as a medicine in Europe. The Cochin-Chinese are said to make their paper from the bark of this or some kindred species of Aquilaria. These trees must not be confounded with the *Aloexylon Agallochum*, or aloes-wood, which is a tree belonging to the natural order Leguminosæ, and which also yields a scented wood used by the Chinese in medicine and perfumery.

(Don, *Gardener's Dictionary*; Lindley, *Natural System*; Royle, *Illustrations*.)

ARA'BIA. The war of Mehmed 'Ali, pasha of Egypt, against the Wahhábís, the occupation of Aden by the British, and their friendly connexions with the Imám of Muscat, have greatly contributed to increase our knowledge of Arabia. In consequence of those events the attention of Europe has been directed more eagerly towards that country, and as the Red Sea now once more offers a passage from Europe to India, we may hope that one of the most interesting portions of the globe will soon become better known. The natives of Arabia have always shown hostile feelings towards Europeans. These feelings may have increased among a few tribes, but generally speaking they have diminished. The intercourse of the British with the Arabs will probably prepare the way for Arabic translations or abridgements of European works on scientific subjects, especially natural philosophy, chemistry, medicine, mathematics, navigation, and generally subjects of practical importance, and thus the Arabs may learn to know Europeans, and we may become better acquainted with them. The coasts of Arabia are now accurately known, except some parts of the south-eastern shore, on the Indian Sea, but even on these we know the position of the principal ports. The splendid chart of the Red Sea by Commander R. Moresby and Lieutenant Carless, in two immense sheets; the chart of the south-east coast of Arabia by Commander Haines, assisted by Lieutenants Wellsted, Sanders, Jardine, Shepherd, &c., and the chart of the Gulf of Persia by Commander Barnes Brucks, in two great sheets, ought to be studied by all those who wish to make themselves acquainted with the approaches to the most important country that lies between Europe and India. A person will be greatly assisted if he studies those charts with the aid of Horsburgh's 'India Directory,' London, 1836, 4to. The best map of Arabia is that of Berghaus, Gotha, 1835. In some places this map is too crowded, so that in spite of the minuteness of the engraving the eye is unable to detect the features of the country. This defect is less owing to the number of places and names than to the amount of hydrographical and orographical delineation, and we find the same defects in other maps of that distinguished geographer, as for instance in his map of China. From the extreme nicety with which the details are executed, an inexperienced person might be induced to believe that what he sees is as accurate as it is neat, but this is not generally the case. In making maps minuteness of execution should always represent minute accuracy of knowledge.

If the map of Arabia is half turned so that the western side shall be nearest to the spectator, the eye will traverse the country from west to east, in the direction of the parallels, and not from south to north, in the direction of the meridians, in which line the general construction of the map
amine them. On viewing Arabia from the Red S
an immense range of mountains stretching fr
to south-east, nearly parallel to the coast of the
generally not far from it. In 21° 20′ N. lat., 41
north of the town of Táyef, and at almost equal
Mount Sinai and the Straits of Báb-el-Mandel
taches itself from that range, and runs north-eas
Persian Gulf, and it becomes gradually lower.
Jebel-'A'red or Jebel-'Imaríyeh: it runs at r
the great range along the shore, and is the l
of the peninsula, which it divides into two grea
one north-west of it, the other south-east.
portion is divided into two by the Jebel-Shamm
called El-Jebel, or The Mountain, a chain st
east to west between 28° and 29° N. lat., and
nected with Mount Sinai by intermediate chai
Jebel-Ajám and the Jebel-Salámí, the position o
ever we do not precisely know. Jebel-Shamm
be as high as Mount Lebanon. The portion n
Shammár comprehends antient Arabia Petraea
and the greater part of antient Arabia Deserta
the most elevated parts are the tracts north of
and east of the chains of Palestine and Syria
ground slopes towards the northern corner o
Gulf. The tract north of Jebel-Shammár is a
intersected by some fertile wádís, or valleys,
water, or only a few wells and moist spots wh
be obtained by digging, and where a few pal
the traveller against the scorching sun. L
Palestine and Syria in the west, the Euphrate
and the more fertile districts of Arabia in t
traversed by several high roads. Through the
part leads the road from Haleb to the Euphrate
Baghdád, by Taíbeh and the Wádí-Súáb; an
east it is traversed by the road from Damasc
through the oasis of Palmyra and the Wádí-H
watered in winter by a considerable river whi
direction of the Euphrates. The tract which
these roads is generally considered to belong to
it has the Arabian character, and is inhabit
Arab tribes. The road from Baghdád to Ane
to Mecca and other parts of central Arabia, cros
portion of Jebel-Shammár. The road fro
Jebel-Shammár, and thence to the interior o
in a south-east direction, following the sinuositie
Aráb-es-Sirhán for above 150 miles, and
fertile plain of Jóf and the desert plain of
Taús before it reaches El-Shammár. Two
lead from Damascus and Jerusalem to the Gul
to Medina. In the direction from the Dea
is a continuation of wádís, but we have
as to their fertility: they seem to be conn
Wádí-Aráb-es-Sirhán by transverse valleys.
thus described is called by the native tribes
wilderness,' or Barr-el-Aráb, 'the desert of th
not very elevated, mostly level, traversed b
intersected by valleys, of which we have only
This observation however does not apply to
Mount Sinai.

The portion south of Jebel-Shammár exte
as the Persian Gulf, and is bordered in the so
Jebel-'A'red, and on the west by the great ra
above, so that the tract between this range and
not belong to it. The country is a high table
towards the north-east, or the corner of the
In 25° N. lat., 46° E. long., a chain of mounta
Túeík, detaches itself from the Jebel-'A'red, str
west in the direction of the Jebel-Shammár.
of the Jebel-Túeík, an irregular square, is much
than the portion east of it, which loses the char
land in proportion as the traveller approach
Gulf, in the immediate neighbourhood of whi
is low and sandy.

The immense inland tract south of the Jebel-
rally speaking, unknown. It is probably a tab
as the tract north of that chain, and its inclina
towards the Persian Gulf, the direction of th
north-east. In its southern portion a lofty ch
with the range along the Red Sea by a high
ridges of hills, stretches parallel to the coast of
in a north-east direction, separating the elevate
interior from the coast country. This chain

ange along the Red Sea, and is consequently
Jebel-'A'red. From its most eastern part a
north west, at right angles, and its direction is
of Jebel Túcik mentioned above. This branch
he peninsular country of 'Omán.

ns made by the Arabs correspond to the geo-
acter of the country. The greater and most
of the interior is called Nejd, or 'high-land,'
orth as far as 29° N. lat. Its southern limits
but it apparently extends as far as a line drawn
where the 25th parallel cuts the Arabian coast
n Gulf, to the point where the 20th parallel
t on the Red Sea. The inland tract south of
erally called El-Ahkaf, or the 'country of the
The narrow tract between Nejd and El-Ahkaf
nd the Red Sea on the other side, is called
orth and Yemen in the south. The countries
these names comprehend also the eastern slopes
nge to a considerable distance in the interior.
e case with Hadhramaút, Mahrá, or Shéher,
e three provinces which border on the Indian
e province of El-Hassá extends likewise over
long the Persian Gulf and the adjoining high-
st.

commencement of the great western range is
of Mount Sinai. A deep inlet, the gulf of
es it from a high chain stretching along the
the gulf, and thence south-east along the Red
mbó. The bold and craggy summits generally
the shore. It has no general name. Along
Jebel-Ashâb and the Jebel-Tibús, the latter
south of them are the Jebel-Aínúneh, Jebel-
y Jebel-Radúá, between the southern part of
he coast is a low and sandy tract; but its
estern parts tower above the shore, and are
names of Jebel-Nábt, Jebel-Lambam, and
Jebel-Sh'ar, at the foot of which lies the
ílah, is between 6000 and 8000 feet high,
ther peaks in the neighbourhood, is visible
miles. Móílah lies in 27° 40′ N. lat. Six
t of it is Rás-Selah, a high promontory, which
tia's Chart of the Red Sea is nearly 40′
: and this error has been copied by many
he prevalent rock of the whole chain is por-
ith craggy serrated summits above a base of
nbó, the port of Medina, lies on the northern
ming a spacious, deep, and safe harbour. It
f the antients, and known in the history of
since Ptolemy availed himself of its situation
nice in Egypt, for fixing it as a base for his
Arabia. He placed Berenice in 23° 50′ N.
correct within a few minutes, which error
l the position of Iambia, which he fixed
But here also his error is less than 10′,
much as 6′, the mean latitude of Yámbó
The direction of the great range from
s far as the promontory Rás-el-hat-bah, in
ontinues parallel to the coast, but is at some
The tract between it and the sea is how-
s, being traversed by portions of the great
inating abruptly towards the coast, from
ated in some places by narrow sandy tracts,
it forms bold promontories along the coast.
el-hat-bah, the last of a chain of steep isolated
hing along the sea, and called Jebel-Kleíá.
e great range from north to south are—Jebel-
tains lofty peaks visible from the sea; Jebel-
, 4500 feet high; Jebel-Ayúb: and Jebel-
latitude of Rás-el-hat-bah the range takes an
, and afterwards running south, forms a bend
the high tract of Mecca, which is about 100
west to east. This crescent-shaped bend, the
arah, is the highest portion of the whole
regard to the orographical features of the
of the most important points; the others are
e southernmost portion of the Yemen moun-
ountains of 'Omán. The axis of Arabia, the
gins here, as above mentioned. Jebel-Kórá-
ove a plateau of great elevation, and several of
g which Jebel-Gazán, or Ghazúán, as Edrísi
highest, are said to be covered with eternal
wn of Táyef stands at the western foot of
; and although the immediate neighbourhood and the deeper valleys produce the choicest fruits, especially excellent raisins, the surrounding plateaus are so high that the water will freeze in the summer nights. From the highest peaks being always covered with snow in 21° N. lat., we may conclude that the elevation is from 15,000 to 18,000 feet. From Táyef the range continues its south-eastern direction as far as a point about 19° 21′ N. lat., where it forms two branches, one stretching south, and lowering gradually till it reaches the coast of the Red Sea in about 18° N. lat., and the other south-south-east. Their direction consequently diverges a little. Between the two chains is a deep valley running from the north, where it is highest, towards the south, where it becomes broader, till it widens into an open plain. This valley is called the Tehmana, or perhaps Tehámah of A'sír, and it lies between the province of A'sír in the east and the lowland (Tehámah) of Kónfodah in the west. One of the most important mountain-passes of this range leads through the valley, and is the high road from Kónfodah to A'sír, and farther on to the interior of Arabia. The point where the two chains originate seems to be a plateau of great elevation; the road from Kónfodah leads over it, and is crossed here by another high road leading from the lowland of Hejáz to the north-eastern part of Yemen (A'sír), through which the Egyptian army penetrated into A'sír in 1836. The same point is the natural boundary between Hejáz and Yemen, and the limit between the range of Hejáz in the north and the range of Yemen in the south.

We resume the description of the coast from Rás-el-hat-bah southwards. The tract round Mecca is traversed by several offsets from the great range, which contain fertile valleys and plains between them, in one of which Mecca is situated. Jídda, the harbour of Mecca, has a good port, but the entrance is dangerous, on account of coral cliffs and shoals, which are common along the northern portion of the coast also, but are nowhere so numerous as on the coast south of Jídda. The coast near Jídda is low, bordered by sand-hills in the east, and it maintains this character for a great distance; the range of Hejáz is seldom visible from the sea. Halí is the last maritime town of Hejáz, and the tract north of it is called the Tehámah (or the lowland) of Hejáz. Where the great range enters Yemen it is called Jebel-Bení-Seíd, or the mountain of the tribe of Seid, which is of volcanic origin. East of it is the province of A'sír, which was first made known to Europeans by Jomard, who compared the accounts of the traveller Tamisier, several French officers in the Egyptian service, and the sheikh A'rís, an intelligent and well-informed native of A'sír. It is a country traversed by considerable streams, with fertile valleys, and inhabited by a numerous and warlike population, whom Mehmed A'li was unable to subdue. The range south of A'sír is called by the natives Jebel, or the Mountain; but portions of it are known by the names of Jebel-Orrá, Jebel-Shähhará, Jebel-Wóredá, Jebel-Hofásh, Jebel-Harras, Jebel-Sumárá, Jebel-Sábber, and Jebel-Yáfaí, the most southern extremity, which is above 7000 feet high. The town of San'á stands on a plateau east of the great range, which is about 4000 feet above the sea, and the peaks west of it are much higher. The whole of the Yemen mountains have a rugged aspect, and they are cut by deep valleys, over which steep granite and porphyry rocks raise their craggy summits. The valleys are well watered and fertile, and the whole is well cultivated; the terraces and slopes are generally covered with coffee-plantations, and the plateaus with corn-fields. The lowland, or Tehámah, has generally a fertile soil, but a barren aspect, except in the rainy season, when it is watered by the mountain torrents, which dry up under the scorching sun of summer. There are however many sandy tracts which remain uncultivated. South of Loheíá, the large bay of Loheíá penetrates into the land, and forms an excellent road, bordered on the south by a peninsula, the west point of which is called Rás-Israel, and separated from the sea by the long island of Kamerán. The passes between the island and the continent are divided into several smaller channels by coral islands, the depth of which is six and ten fathoms. Between Rás-Israel and Rás-Katáb, in the south, is another open bay, nearly as large as that of Loheíá. North-west of Rás-Israel is the small island of Jebel-Tár or Tór, also called Shebán and Jebel-Dauhán, or Smoke Hill, a name which it derives from a volcano which, though nearly extinct, still smokes.

Cape Báb-el-Mándeb, that is, the 'gate of danger,' the most south-western point of Arabia, and of all Asia, lies in 12° 40′ N. lat., 41° 11′ 30″ E. long., and rises abruptly over the low coast, at the extremity of a small tongue of land. The width of the straits of Báb-el-Mándeb, between the cape and the coast of Abyssinia, is about 14 miles; the island of Perún, or Mehun, divides it into the great or western channel, which is 10½ miles wide, and in the middle above 100 fathoms deep, and the little or eastern channel, which is 3 miles wide, and never less than 10 fathoms deep.

The great range stretching from Southern Yemen north-east to 'Omán is very imperfectly known. From Jebel-Yáfaí a chain stretches east near the coast, rising by several terraces to a height of above 5000 feet, and it continues in that direction under the names of Jebel-Hamarí, and Jebel-Ghoráb, which are in the country of Hadhramaút, parts of which have been visited by Wellsted and Haines. The tract north-west of these ranges, in the direction of San'á, is a sandy plateau traversed by some ridges of hills, and intersected by wádís of no great fertility. The interior of Hadhramaút was entirely unknown to Europeans until it was lately visited by the Baron de Wrede, a German gentleman, whose account has been published in the fourteenth volume of the 'Journal of the Royal Geographical Society of London' (1844). The baron having been robbed of most of his papers by order of the Sultân of Seíf, the account is very short; but his description corresponds generally with the accounts of Edrísi, Abú-l-fedá, Hájí-Khâlfah, and other Eastern geographers. Starting from Makallá, he traversed in a north-western direction a mountainous tract, rising in terraces, and crowned by granitic rocks with craggy summits about 2000 feet high. On the fourth day he traversed Mount Sidara, 4000 feet high: it appears to be situated about 60 miles from the coast. On the fifth day he ascended a high yellowish plateau about 8000 feet high, the east part of which was overtowered by the summit of the colossal Kar-Seban.

The plateau extended as far as the eye could reach from west to north-east. Iron-sandstone was observed on the whole plateau, overlaid by a yellow and hard sandstone of a fine granular texture; and the plain was traversed by ridges of hills with conical summits, and intersected by deep and narrow ravines (wádís), through which the rain-water flows into the lower regions. On the ninth day the traveller reached the Wádí-Dóán, the chief object of his search, which, from its commencement about 130 miles north-west from Makallá, stretches, according to all appearance (the baron does not give its direction), east, south-east, and south, till it reaches the sea near Sähüt, a small village about 140 miles north-west from Makallá. The baron was only allowed to visit the upper part of this celebrated valley, which has different names in different places. Following the opinion of Niebuhr, our best geographers have put the Wádí-Dóán 350 miles north-east of Makallá, in the unknown desert north of the country of Shéher, though Seetzen observed that it was only a branch of the upper part of the valley of Hadhramaút, which, according to the same traveller, begins five journeys from Makallá. Seetzen's further description of the valley of Hadhramaút corresponds with that which Baron de Wrede gives of the Wadí-Dóan; and as both agree that the Wádí-Dóán, properly speaking, is a branch of a greater valley, the valley of Hadhramaút of Seetzen, and the Wádí-Dóán, in a more extensive sense, of the baron, we conclude that in this case Niebuhr and those who followed him are wrong. The difference in the journeys from Makallá, the beginning of the Wádí-Dóán, is no absolute difference of distance, since the baron made the way in eight and a half short journeys, each of less than six hours; while the five journeys of Seetzen might be longer journeys. From Khoreibeh, a town in the Wádi-Dóán, the baron travelled south-west to the Wádí-Webbene, which is the northern part of a long valley bearing the successive appellations of Wádí-Hagger, Wádí-Giswuel, and Wádí-Mefah or Maifaah, under which name it reaches the sea near Bir-el-Häsi. This is the Wádí-Meifah which was visited by Wellsted on his tour to Nakab-el-Hájar. Near Hota, a town in the Wádí-Hagger, the valley is watered by a continually running stream that rises four journeys north-west from that town, and of course continues its course through the lower parts of the valley. This stream comes apparently from the neighbourhood of the Wádí-Máreb, and is perhaps the same by which this fertile valley is watered, and which supplied the famous reservoir of Saba or Máreb. We thus see that the country of Hadhramaút is traversed by two long rivers, one originating not far from Wádí-Máreb, and running south-east and south for a distance of about 150 or 160 miles; and the other, the river of Dóán, flowing east, south-east, and south for nearly 300 miles. But neither of them reaches the sea, which is the case with nearly all the rivers in Arabia; and it may be doubted if they flow during all seasons, it is possible that they never dry up entirely in all From Khoreibeh the baron travelled six good journeys west and west to Sava, in the Wádí-Rachie (Rakhí), we presume to be in 17° N. lat., 46° 12′ E. long., or abouts: no accurate computation is possible. This runs north eight journeys. A six hours' journey north-brought the traveller to the edge of the desert called Bahr-el-Saffi, one of the most extraordinary the surface of the globe. It is an immense sandy 1000 feet below the level of the high land (from which baron descended), and strewed with numberless hills, without any trace of vegetation. There of dazzling whiteness, which contain deep chasms filled brim with powder-like sand. The traveller, having a plummet of about one pound weight attached to a sixty fathoms into one of these sand-gulfs, which was two miles long and nearly as broad, saw it sinking diminishing velocity for about five minutes, when the the cord disappeared in the chasm. The baron made the experiment in the most northern chasm, which we must conclude that Bahr-el-Saffi, that tract containing such chasms, stretches south from the where he reached the border of El-Ahkaf. He that Bahr-el-Saffi is the border of El-Ahkaf, stretching the spot where he reached it to Kubr-el-Húd, a eight journeys; and as, according to his statement, Húd lies in the lower part of Wádí-Dóán, towards the Bahr-el-Saffi designates as well the edge of of that extensive wádí, as the spot where the sand-He further says that Bahr-el-Saffi is inaccessible in its extent towards Kubr-el-Húd; but this is contradicted own words; for as it begins one journey north-west Sava, and thence stretches east, and as the Wádí-begins at Sava, and thence stretches north, it is evident Bahr-el-Saffi is traversed from south to north by the Rachie, and is consequently accessible. It is extremely cult to combine all the accounts of the baron, and to a map of the country explored by him. The desert Hadhramaút and Middle Yemen, where the sand-is called Sahid, or Dhahir, by the Arabian Bahr-el-Saffi, or the sea of Saffi (perhaps Barr-el-desert of Saffi), is said to be called so on account of Arabian king, having perished there with his army attempt to march through it. His fate reminds us of Gallus, who, on his retreat from the interior of wards the sea, seems to have passed some distance north from the spot where King Saffi perished. (Strabo, &c. Cas.; Jomard, in Mengin, cited below, p. 383,

The whole country east of Hadhramaút as far as entirely unknown to us, though the greater part of the has been surveyed. Parallel chains of mountains run coast, pressing in some parts upon the sea, and separated in others by narrow sandy tracts. Makallá lies in N. lat., 46° 50′ 30″ E. long., in the corner of a fine at the foot of a high and barren mountain. Rás-bold promontory, in 15° 37′ 30″ N. lat., 49° 58′ E. visible at the distance of 26 leagues from the Morebát, a low cape east of Rás-Tartak, is in 16° 55′ 52° 31′ 35″ E. long., according to Capt. Owen. a high tract borders on the sea, being a terrace leading and steep chains, which stretch in the same direction, visible from the sea at the distance of 20 leagues. Their has been estimated at 5000 feet. The interior has the of Shéher, and is inhabited by the tribe of Mahrah, it is generally, though erroneously, called Mahrah. language of this tribe has always been, and still is, ferent from the Arabic, being probably derived antient Hamiaritic language. The inland tract of described as an awful desert, but the mountainous tract the coast is fertile, and in many places the mountains covered with forests, a rare circumstance on this coast. Rás-Tartak the coast turns north, keeping that about 60 miles, when it resumes its north-eastern far as Rás-Morebát; thence it runs north-east and about 90 miles; and again running east about 60 compasses the Gulf of (Júna-l-) Hashish, or Kuria-which is the name of a group of islands situated at its The eastern termination of this bay is Rás-Kanselí. the coast describes another curve, forming the bay of which is terminated to the east by the lofty promontory Madraka, in 17° 58′ N. lat., 55° 34′ 15″ E. long. this point the direction of the coast is north and north-

are not known. Opposite it lies the long
erah, the eastern coast of which has been sur-
ast terminates to the north-east with Rás-Jíns,
ory, backed by a chain of lofty mountains, in
57° 35′ E. long. A little north of it, in 22°
57° 32″ E. long., is Rás-el-Hád, a low point,
mán begins, or the part of the Indian Sea
reen the coast of 'Omán and the coast of Be-
om Rás-el-Hád the coast of 'Omán turns west
in two crescents: one of them, which is small,
hat cape and Rás-Heírán, near Muscat; the
as a chord of 240 miles, and advances to the
26° 21′ N. lat., 56° 35′ E. long. (in the map
hen it terminates with Rás-Musendom. The
us, between this cape and the coast of Persia,
iles wide at the narrowest part. The coast of
ally low, being a narrow 'tehámah,' backed by
hills. Near Muscat rocks tower above the
ther, in the south-east, is said to be 6000 feet
north-west continuation, Jebel-Akdar, has an
: a peak which is south-west of this chain is
till farther west begins the sandy table-land.
ct is called El-Tehabet; it is unknown to us:
inhabited by a tribe called Zaraká, whence
Saracens. 'Omán is generally a fertile well-
, though containing sandy districts, as we see
otion of Wellsted.

ndom the coast suddenly turns south-west, and
at direction for above 200 miles along the
he peninsular extremity of Arabia, between
e Gulf of 'Omán, is about 170 miles broad at its
as long from south to north. From the western
of the peninsula the coast runs west for near
hen north for 140 miles, as far as Rás-Aufir,
ense bay, the shores of which are generally flat,
r outline, intersected by numerous creeks and
lined by numerous islands and coral cliffs.
ays infested this dangerous coast, and they
irely destroyed, in spite of the vigilance of
e British navy. From Cape Aufir the coast
, which direction it keeps for about 80 miles,
s former north-western direction, forms a deep
of Bahrein, in the middle of which lies the
Bahrein, noted for pearl fisheries. The coast
s indented by many smaller bays and creeks,
l and safe anchorage, and the whole tract is
frequented of Arabia. A little south of Rás-
t the north-western extremity of the gulf, is
-Katif, in a fertile and well cultivated tract,
west by the desert, and noted as a commercial
26° 29′ 30″ N. lat., 47° 41′ 30″ E. long., and
nd defended by a Turkish garrison, the com-
n depends upon the Pasha of Basrah. The
or Aíndar, once in the possession of the
carried on a great trade between Persia and
supposed to be in the innermost corner of the
here called the bay of El-wáh. From Rás-
ast runs in a curve north-west, north, and
o the Shat-el-Aráb, forming a great number
hich are dangerous to approach on account of
shoals. The tract along this coast, or the
' El-Hassá, is flat and covered with sand to a
t it also contains many fertile and well culti-

between El-Katif and El-Derá'iyeh, has been
o us by Captain Sadlier, the first European
Arabia from one coast to the other: and the
Derá'iyeh to Medína was seen by the same
he French officers who accompanied the
ráhim Pasha against El-Derá'iyeh, the former
ahhábis. But all that we know of this tract is
to the routes or is derived from the descrip-
res. The country rises in terraces from the
wards the interior. The first terrace begins
westward from the coast, where Sadlier felt
here, but the ascent is gradual. The country
ren, being a rocky soil covered with pebbles
rtly hilly, partly level. There seem to be a
e tracts at some distance from the common
ond terrace begins in the neighbourhood of
Mánfuhah, where the high land is cut by fertile
with date-trees; the plateaus afford excellent
for horses. Derá'iyeh, though destroyed by the Egyptians, is a place of importance and has always had a large trade, being a central position, and connected by great roads with all the provinces of Arabia. West and south-west of this town are the highest portions of the central table-land of Nejd. The common road to Medína has a north-western direction to Aneízeh, where it joins the high road from Baghdád and Damascus. The position of Aneízeh is as important as that of Derá'iyeh; it is in the province El-Kasím, at nearly equal distances from the Persian Gulf and the Red Sea, west of Jebel-Tuefk, south of Jebel-Shammár, and north-west of the province El-'A′red, in which Derá'iyeh is situated; the tract between this province and El-Kasím is the province of El-Wóshem. The road from Aneízeh to Medína runs westward across chains of sand-hills stretching from south to north, thence across other barren hills called Jebel-T'ayeh and Jebel-Maúyeh, as far as Henákíyeh (Heníkah) in the neighbourhood of Jebel-'Ohod, a mountain of red granite, whence it turns south-south-west to Medína and passes through a desert which is a stony plain traversed by chains of barren rocks and sand-hills. Water is not scarce, but there are few villages, and the cultivation of the more fertile tracts is neglected, probably in consequence of the Wuhhabi war. Henákíyeh is placed in Houghton's map 36 miles north-east of Medína, in 25° 22′ N. lat., 36° 55′ E. long. The account of Sadlier of this part of his route is very incomplete. In the map belonging to Burckhardt's Travels, Henákíyeh lies in 25° 35′ N. lat., 38° 35′ E. long.; and in Jomard's map of Nejd, in 25° 58′ N. lat., 38° 20′ E long.; Berghaus computes it to be in 26° 9′ N. lat., 38° E. long., 75 miles north-north-east from Medína, and he seems to be more correct than the others; Houghton is apparently wrong. A glance at the map will show that the position of Henákíyeh is of great importance; the road from Aneízeh to that town is evidently the high road to Medína as well as to the upper part of the Red Sea; the former branches from that place south, the latter continues in its western direction.

The axis of Arabia, the range of El-'A′red or Jebel-'Imariyeh, begins, as above mentioned, in the environs of Táyef, where it is connected with Mount Korá-Kharah, which is part of the Hejáz chain, by the lofty peak of Gazúán and its offsets. It stretches north-east as far as Derá'iyeh. We know it only from the descriptions of the natives and some Arabic writers, but D'Anville placed it in his map of Arabia. Its north-western declivities are steep, white rocks rising like a gigantic wall, along the foot of which runs the road from Derá'iyeh to Mecca mentioned by Edrísi, and which is marked with its stations on most of our maps. In the south-east this chain borders on a sandy table-land, and it seems that the great gap which, according to Ritter's opinion, traverses the peninsula from the west in the direction of Derá'iyeh, runs across that table-land at some distance south-west of the chain of El-'A′red. There is another road, first mentioned by Baron von Hammer, who derived his knowledge from Eastern sources, which leads from Der'iyeh to Mecca by Meráb, Shár, Jenánij, Merkab, Menkhaná, 'Ablah, Sekiyeh, and Dhat-'Ark, where it joins the northern road: it runs south-east of, and generally parallel to, the chain of El-'A′red. But whether those places are situated on the table-land between the chain and the supposed gap, or in the gap or valley, we cannot determine. The road is not mentioned in any of our maps. The town of Deríyeh, which is known to us by the descriptions of the natives as being situated in or near the western part of Mount El-'A′red (it is in the map of Berghaus), is most probably on that road which continues from that place south-west to Mecca, while another road, which has a southern direction, traverses the fertile and well cultivated district of El-Bakarrá, and leads to 'Asir and the other districts of Northern Yemen. The province of 'Asir is traversed from west to east by four considerable streams which unite in its eastern part and form the river Bisheh, which, according to a brief account lately published by Jomard, continues its eastern course towards the Wádí-Dówásir, a distance of about 200 miles. Jomard thinks that the river Aftán, which according to the Arabian geographers traverses the province of El-Hassá from west to east, and empties itself into the Persian Gulf somewhere below El-Katif, is the continuation of the river Bisheh. The stream in the valley of Derá'iyeh flows into the Wádi-Aftán, and we can trace this Wádi still farther to the west. Niebuhr observed that there was no perennial stream in the Wádi-Aftán, nor has Captain Sadlier, who twice crossed the line in which the Aftán was supposed to flow, observed anything like a river in that tract. On the other hand, it is difficult to explain where the river Bísheh finally flows to. Its direction is certainly north-east, and the natives say that it enters the Persian Gulf. The difficulty seems to be solved by supposing that it flows into some lake, and such is the lake Salome, which, according to the account published by Jomard,* is east of the Wádi-Dówásír, and into which the river Bísheh flows after having watered that Wádi. It is said to disappear at some places, and to re-appear farther down—a phenomenon observed in other rivers. The same account, which is derived from trustworthy natives, also says that the Bísheh, after having traversed the lake, continues its eastern course and empties itself into the Persian Gulf. It would be presumptuous to reject these accounts altogether, since they corroborate each other, and are confirmed by the authority of Arabian geographers to whom we trust in many other cases. But we owe the same respect to the evidence of Sadlier also. It is the writer's opinion that the lake Salome receives the river Bísheh, but that owing to the evaporation the lake has no outlet except when its waters rise in consequence of extraordinary rains or snowfalls in the mountains of Asír and on the range of El-'A'red. If this is admitted, there will be no difficulty in assuming that the surplus water flows through the Wádí-Aftán to the Persian Gulf. Such rains or snowfalls may be rare phenomena, and the Wádí-Aftán may remain dry for many years, especially in the lower part, where the climate is intolerably hot, and the sand soon covers the beds of the rivers if it is not carried away by a constantly running stream. Such may have been the case when Sadlier crossed the line of the Aftán without perceiving any trace of a river. The Bísheh probably flows in the gap above referred to. The length of the Wádí-Rachie, mentioned by the Baron von Wrede, is eight journeys: it joins the Wádí-Kasr: it runs apparently as far north as the Wádí-Dówásir, and its stream flows probably into the Bisheh; but the Wádí-Rachie is partly filled with sand, and a constantly running stream is questionable. In Jomard's map of Asír there is another river, the Tárabeh, which originates in the elevated tract near Táyef, and flows north-east, but does not join the Bísheh. This river seems to run towards El-Bakkará and joins the Bísheh perhaps farther east. In Berghaus' map these streams are laid down in a very indistinct way: the eye can neither discover whence they come, nor whither they run, nor how they are connected. The position of the Wádi-Dówásír must be understood to be in 19° N. lat., which is the latitude of the northern part of Asír. So it is in the map of Berghaus.

The remaining part of the interior of Arabia, between Yemen and 'Omán, Nejd and Hadhramaút, is a tract of which we have no knowledge. It is generally believed to be a desert, and has been represented as such by the natives, although in the Jíhán-numá of Háji-Khalfah it is only described as an interrupted wilderness, inhabited in some places, so that the traveller is always sure to sleep at night in a human dwelling. It is called El-Ahkaf, because it contains many barren tracts covered with sand-hills, but this term is frequently employed by the Arabian geographers in their description of other parts of Arabia The unknown part of Southern Arabia begins at the Wádí-Rachie, in the west, in about 46° 20′ E. long. That meridian forms its limit as far as 20° N. lat., in the north-eastern corner of the Wádí-Afláj. A line drawn from that spot north-west to the eastern boundaries of El-Bakkará mentioned above; thence north-east along the range of El-'Ared as far as the meridian of Derá'iyeh; thence south-east to a point in 24° N. lat., 47° E. long., and thence east to the frontiers of 'Omán, forms its northern boundaries. Its eastern boundaries are 'Omán, and its southern the coast as far as the Wádí-Dóán, which they follow north-west as far as the Wádí-Rachie. The terrific descriptions which the Arabs give of this tract are as exaggerated as their praises of the beauty of the oases, which are generally only a valley watered by a little stream overhung by a few date-trees and bushes. The Arabs understand each other very well when they speak in hyperboles. Niebuhr once heard an Arab speak of an animal 'with the head of a horse, the breast of a lion, the feet of a camel, the body of a snake, the tail of a scorpion, and horns with a maiden's (meaning long) hair.' By this he meant not some antediluvian monster, but—a grasshopper (locusta). It is just so with the descriptions of the deserts, which in the south of Arabia are certainly not more dangerous than in the north, where they have been and still are traversed by many Europeans. Edrísi says that El-Ahkaf is traversed
length from 'Omán to Mecca by a road on which
four stations; and a modern traveller (Buckingham
Mesopotamia, p. 47, 48) met with a pilgrim wh
that this road is still frequented, but leads thr
tracts inhabited by a warlike population. Anoth
formerly known between 'Omán and Dówásir,
was a fair frequented by people from all parts of
even of India. Burckhardt mentions a road fro
Nejd, through the Wádí-Jebrín, to Hadhrama
frequented in summer. This road must cross
Saffi (the northern and western barrier of Hadh
that dreadful spot is consequently accessible not
the Wádí-Rachie, but through the Nejd road al
course we do not mean the sand-gulfs. It is
English gentleman has lately started for Southe
with a view of traversing it in its whole width
Ahkaf, and there is little doubt that he will effe
pose unless prevented by the natives. The
seems to be inhabited by Beduins or Nomadic
there is little chance of finding towns or many
ments. The maps attached to the editions
have induced many to believe that he was acqu
a number of towns in the tract which is now called
and Jomard, excited by hopes of 'making conqu
desert,' thinks that if we knew all Arabia, our
country would differ little from that of Ptolemy.
at all likely. Ptolemy had certainly a more exte
ledge of Arabia than any other antient or modern
but his knowledge was not accurate, and if we sh
in bringing his confused ideas into harmony with
it is more probable that his map would be like o
ours should be like his. The writer has in his pos
number of extracts from Arabic geographers and hi
have never or seldom been made use of for geog
poses, their works being still in MSS.; but little
be derived from them for 'conquests in El-Ahk
them, Ibn-Khordádbeh, filled the office of post
the earlier khalifs, and his geographical work (M
interesting details, routes, stations, wells, wadis,
little that he knows of El-Ahkaf is of so vague a
to be useless for a map. One of the greatest
using the Eastern geographers is to determine
their journeys, and although modern travellers are
tive, they are not all so careful as Niebuhr.
Arabia use either asses, camels, or horses. As
rally used in the mountainous districts of Yemen
maút, and their speed is about 1750 double or
(five feet) in half an hour, as Niebuhr states. Ni
a good journey, and the distance performed in tha
be a trifle more or less than thirty miles, makin
an hour. This is good travelling for shorter dist
longer distances the time as well as the num
would be too much, as we see from Captain Sadlie
which shows an average of only 2·21 miles an ho
travel about one-fourth quicker than asses, especiall
or with other camels, but caravans always travel
camels will run for many days at the rate of 50
and the statement of Edrísi that the enormous d
(the confines of) 'Omán to Mecca, nearly 1200
formed in 21 journeys, might be true, though no
duin courier could support the fatigue of such a jo
distances given by the Arabs are seldom real dist
generally mean to say that when *they* travelle
such a place, they were so many days on the
whether they travelled in a straight line or by
road is another question.

(Niebuhr, *Reise-Beschreibung nach Arabien*
Ländern; Seetzen, in the 28th vol. of Zach,
Correspondenz; Burckhardt, *Travels in Arabia*;
Mengin, *Histoire Sommaire de l'Egypte*; Jomar
tion du Nejd; Berghaus, *Geo-Hydrographisc*
zur Erklärung, &c. der General-Karte von Ara
Nil-Lande; Hammer, in *Wiener Jahrbücher de*
vol. xciii.; the Sources quoted in the text.)

ARA'BIA PETRAE'A ('Αραβία ἡ Πετραία)
western corner of Arabia, was so called from
town Petra, where the king of the Nabathaei re
time of Augustus. Its limits to the west and nor
the Sinus Heroopolites, now Bahr Súez, or the
and Lower Egypt; to the north Judaea; to the
Deserta; and to the south, Arabia Felix. In all
tions the limits were not fixed. The most cons

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* In 'Documens et Observations sur le cours du Bahr-el-Abiad et sur quelques autres points de Géographie.'

insular tract round Mount Sinái, separated from rt of Arabia Petraea by the Sinus Aelanites, now The name of Arabia Petraea is not very antient, : of the town Petra seems to have been unknown ne of Alexander the Great; the country however in the Scriptures as being connected with the ear- f the Jews. Ishmael, the chief of the tribe of the and the supposed ancestor of the Arabs, had his bia Petraea. (Genesis xxv. 18.) Other tribes men- e Scriptures are the Ammonitae, Moabitae, Ma- alekitae, Hagareni, and Edomitae or Idumaei, who e tract bordering on Judaea, which was called Idu- he time of the Romans, the Nabathaei or Nabataei ing nation in Arabia Petraea, and are said to have name from Nabajoth, the eldest son of Ishmael, equently the same tribe as the Ishmaelitae of the In the time of Augustus the Nabathaei possessed part of Arabia Felix also. The name of Arabia ot mentioned by Strabo, who calls the country ἡ Ναβαταίων, the Nabataean Arabia. Trajan s country, and united it to Palestine; it was after- Palaestina Tertia, and thus Stephanus Byzantinus ys that the town of Petra was situated in the ne. [Petra, P. C.] King Baldwin I. con- of the country, and caused its principal town, lled Mont Royal. The antient writers mention in Arabia Petraea, among which Petra is first tood in the Wádi-Músa, about half-way be- ead Sea and the Gulf of Akaba, and it was kem [Arabia, P. C. and P. C. S.]

Notitiae Orbis Antiqui, iii. 14; D'Anville, *aphy*, vol. ii. pp. 437-443.)

IDA (Fossil) occur in the coal formation of Prestwich.)

:TER (from the Greek ἀραιός, *light* or *thin*, and *tre*) is an instrument employed for the purpose the specific gravities of fluids, generally such se than water, but capable of being used also to se of any fluids, and even of solid bodies. It e from an hydrometer, and in its simplest state a glass ball, hollow, and having attached to it em also of glass: a weight was applied below er that the instrument might float in a vertical partly immersed in a liquid; and the different h it sunk in different fluids were indications of nsities of the fluids, the volume of a cylindrical n any two graduations on the stem being some the whole volume of the instrument.

ument of this kind was soon found to be very when immersed in different fluids, the eleva- about the stem, in consequence of capillary nequal, and thus the difference between two mes could not be correctly estimated. Fahren- it by forming at the top of the stem a small weights, by which, when the instrument was fluid, it could be sunk down till a permanent stem was at the level of the fluid surface: the instrument itself, with that of the objects in the ether, of course, equal to the weight of the fluid he immersed part; and the difference between the cups, when the mark was successively at f two different fluids, allowed a nearly correct e made of the difference between the specific e fluids.

nges have since been made in the construction ent; and the best form is probably that which t by Nicholson, and which bears his name. It ollow cylinder, or sphere, of copper, from each which proceeds a stem; that which, when the in a vertical position, is uppermost is a wire of l about 1-40th inch in diameter, and, like Fah- ument, it carries at its top a small cup in which e placed: to the lower stem, which is short, is rup carrying a cup in which may be placed a ose specific gravity it may be required to deter- nstrument is so adjusted that, if a weight equal s be placed in the upper vessel, the whole will ed water at a temperature expressed by 60 de- enheit's thermometer, till a mark made on the vel with the fluid surface. When the specific uid lighter than water is to be determined, the plunged into the fluid and weights are placed vessel till the mark on the stem is at the surface; then, if w in grains, be the weight of the instrument when unloaded, and w' the weight placed in the cup as just said: also if s be the specific gravity of distilled water, and s' that of the fluid in which the instrument is placed, we have, by hydrostatics,

$$w + 1000 : w + w' :: s : s';$$

whence s' may be found.

To obtain the specific gravity of a solid which does not imbibe water: after placing the instrument in distilled water let the body be laid in the upper vessel, and weights, in grains, added till the mark on the stem is at the level of the surface; these weights being subtracted from 1000 grains, leave the weight of the body in air: then placing the body in the lower vessel, let other weights be added in the upper one till the mark on the stem is again at the surface of the water; these additional weights will express the loss which the body sustains by being immersed in water. Consequently if w'' be the weight of the body in air, w''' the loss just mentioned, s the specific gravity of the water, and s'' that of the body, we have by hydrostatics,

$$w''' : w'' :: s : s'';$$

whence s'' may be found.

If the substance whose specific gravity is required be, like wood, capable of imbibing water during the experiment, it should be left in the lower vessel, while under water, till the instrument is stationary, when the additional weights in the upper vessel will express the weight of the displaced water together with that which is imbibed; then, having dried the surface, let the substance be placed in the upper vessel and weighed in air as at first: the difference between this weight and that which was found before the substance was put in the water is the weight of the water imbibed; and this must of course be subtracted from the observed weight of the substance in water, previously to substituting the values of the terms in the proportion. The theory of the aræometer and hydrometer is given in Gregory's 'Mechanics,' vol. i. art. 406, &c.

For fluids of greater specific gravity than water, such as the concentrated acids, an instrument of the like kind which was invented by Guyton de Morveau, and is designated 'Gravimeter,' may be used. It is made of glass, with an upper and lower cup, in the former of which may be placed a constant weight, and in the lower a glass ball containing mercury. The weight of this body in air is made exactly equal to the constant weight together with the weight of a body of distilled water equal in volume to the ball containing the mercury. It is evident therefore that in the water this last object will be exactly equivalent to the constant weight, supposing the latter to be placed in the upper vessel; so that, in use, its weight is expressed by the number of grains in the constant weight, and at the same time it serves as ballast, allowing, on the instrument being plunged in a fluid more dense than water, a weight to be placed in the upper vessel much greater than that which could be otherwise introduced consistently with the preservation of the vertical equilibrium.

Now the constant weight being that which, in distilled water at the standard temperature, sinks the instrument till the mark on its stem is at the level of the surface; the weight of the instrument without the ball of mercury, together with the constant weight, is the weight of a volume of the water equal to that of the immersed part including the ball; and when the instrument is introduced in a heavier fluid, its weight together with the constant weight and as many grains as will depress the mark to the surface, will be the weight of an equal volume of the fluid. Consequently the former weight is to the latter as the specific gravity of the water is to the required specific gravity of the fluid; which last is thus found.

ARANJAA, in P. C., is a misprint for *Aranea*. [Arachnida, P. C.]

ARAUCARITES (Presl), a genus of fossil plants found in the lias of Lyme Regis.

ARAXES. [Aras, P. C.]

ARCADE. In addition to its proper technical meaning, this term has of late acquired a different signification among us as the popular name for what the Parisians more properly designate a 'passage' or galerie, viz. an alley lined on each side with shops, and roofed over so as to be in fact a sort of 'in-door' street, entirely protected from the weather, and of uniform design throughout in its architecture. So far, the arcade answers to the idea of a bazaar, the chief distinction between the two being that the latter has not so much a street character about it, but consists either of a single spacious hall or separate rooms, fitted up with counters and stands.

and may therefore be likened to a single large shop occupied by a number of different dealers, whereas in an arcade the shops are quite distinct from each other, and enclosed in front with windows after the usual manner; and they have besides dwelling accommodation, kitchen, &c. beneath, and a chamber over them, with the addition sometimes of an entresol. Another distinction is that an arcade serves as a public thoroughfare for foot-passengers. As to such a place being a very great public convenience there can be but one opinion,—as in dirty or wet weather, when the advantages attending such mode of building make themselves felt very sensibly. The Burlington Arcade, which was the first place of the kind in London, has indeed little more than its convenience as a thoroughfare and promenade for foot-passengers to recommend it, inasmuch as it makes no pretensions to elegance of design, nor has it anything in accordance with the title bestowed on it, it being neither arcaded in any way nor arched over. The Lowther Arcade in the Strand (erected 1831) manifests very great improvement upon that first specimen, for it is really a very handsome and tasteful piece of architecture; the side elevations are divided by pilasters into compartments, each of which contains a shop-front, with an ornamented triple window over it, and above that a semicircular one in the arched head of the compartment. On the plan, each of these divisions is covered by a pendentive dome with a circular skylight; and these numerous domes and their arches produce a singularly pleasing perspective effect. The same may be said of the Royal Arcade at Newcastle, erected a few years later, inasmuch as it is the same design, with only some slight alterations—and those not for the better in the side compartments; yet where, while so little has been done, there is such ample scope for variety, this mere repetition might have been avoided. Another provincial structure of the same class does however furnish us with an example of something decidedly different, and marked by one striking peculiarity in regard to its plan: the Victoria Arcade at Ryde in the Isle of Wight, completed in 1836, after the designs of Mr. W. Westmacott, consists of two avenues or galleries crossing each other, with a rotunda at their intersection. This circular part of the plan is disposed in eight compartments, placed alternately, viz. four with shops, and the others open to the avenues. This space, which has a fountain in the centre of it, is covered with a flattish dome with a single row of large panels, but the avenues are not arched. Although in point of architecture this example is exceedingly plain, the general combination is highly effective and pleasing, and also suggestive of many other ideas. The central avenue of Covent-Garden Market also affords an example of what, though not so called, may be classed as an arcade, inasmuch as it is a covered street of shops; and it is referred to as exhibiting a very different character from the preceding ones, it being totally devoid of decoration, yet possessing much architectural expression in its upper part on account of its open timber roof, and the 'clerestory' formed by openings which are left unglazed in the upper part of each side; consequently the light is admitted laterally, though from above, therefore with a different effect from that attending lanterns or skylights. In regard to degree of architectural adornment this example ought to be placed first, as being of far more primitive character than the others, and without the least attempt at decoration of any kind. In the new Exeter Change, on the contrary (erected 1843-4, by Mr. Sydney Smirke), decoration of quite a novel kind, for this country at least, is introduced, there being no previous application of it, in any such place, if we except the Pantheon Bazaar in Oxford Street;—namely, polychromic embellishment, which is there applied both on the upper part of the walls (in ornaments and pannels between the windows over the shops) and on the cove of the ceiling. The plafond of the latter may be said to be open, it being merely glazed so as to form a continuous skylight over the avenue, which circumstance constitutes a strong point of difference between this and all the preceding examples. No less difference is there in several other respects; the whole place has more the appearance of a hall or gallery than of a place of thoroughfare and business. Besides that it is of short proportions, the length being only about five times the width, it is more enclosed, therefore has more of in-door character, for instead of being open at the ends, or entered immediately from the street, it has a vestibule at each end, both of them polygonal in plan, yet not exactly alike, the one being a hexagon, the other a heptagon, which are ingeniously adopted in order to obviate the difficulty of site, viz. the oblique position of the 'passage' between the two streets
which it connects. It is perhaps to such difficu
we are indebted for a novelty of plan and ensem
out it would not have been sought for. Th
greatly enhance the effect of the avenue itself
they render it by contrast loftier than it would
pear, in consequence of their being only half as
Pantechnicon near Belgrave Square is a 'passage
which although of plain is of pleasing characte
peculiar air of spaciousness and cheerfulness.
Parisian arcades, the Passage Colbert is one of th
ing, both for its extent and architectural disp
which last its Rotunda contributes in no small de

ARCA'DIUS CHARI'SIUS, AURELIU
sius, P. C. S.]

ARCHES, COURT OF. At the time wh
article under this head was written (P. C.), it w
that the Court of Arches would have been affe
neral measure for the reform of the ecclesiastical
the attempts which have been made to accompli
have not hitherto been successful, and more tha
consolidating the jurisdiction and improving th
these courts has been abandoned. In the sessi
bill was brought into the House of Commons 'F
Appeals to the Court of Arches.' The preambl
it 'would tend to the saving of expense, and to t
ministration of justice, if either litigant party in
suit in any ecclesiastical court, either in the provi
terbury or in the province of York, had the rig
such suit into the Arches Court of Canterbury;'
did not pass into a law. In the same sessio
brought forward in the House of Lords relating
siastical courts generally, which, among other
vided for the consolidation of the Court of Ar
Prerogative Court of Canterbury, by transferri
diction of the latter court to the Court of Arch
bill was not carried. By 3 & 4 Vict. c. 65,
Arches is empowered to sit as assistant to or in
judge of the Court of Admiralty. [ADMIRALT
P. C. S.] Advocates admitted in the Arches C
terbury are admitted to be advocates of the H
Admiralty of England.

A Parliamentary Paper (No. 327) printed
session of 1844 contains some information re
practice of the Court of Arches. There are
regulations, or resolutions made by proctors o
or Prerogative Courts of Canterbury relating to
of clerks to proctors, or to the admission of pr
articling of clerks and admission of proctors are
a statute of the archbishop of Canterbury, bear
30th of June, 1696. By this statute, the numb
having then increased to forty, it was, among
ordained that there should be thirty-four procto
the Arches Court, each of whom should have p
vilege to take clerks apprentices, and that the re
tors should be esteemed and called supernum
should not have power to take such clerks unti
have succeeded into the number of the thirty-fou
no proctor should take any clerk apprentice un
have continued *exercent* in the Arches Court five
the term of service of a clerk should be seven ye
no proctor having one such clerk should be cap
another at the same time, until the first should
five years. It is in practice required that a
have been five years on the list of the thirty-fou
fore being allowed to take an articled clerk. T
rules observed with respect to the qualificatio
clerks which are not contained in the annexed
by which the age of the clerk is required to be
not above eighteen years; and the other, tha
should not have been a stipendiary writing-clerk.
rule with respect to age has, under particular c
been occasionally dispensed with by the judge.
and authority for these two rules are not known.

The ordinances and decrees of Sir Richard
of the Prerogative Court, mentioned in the statut
1686, do not appear to have been registered. It
that they must have been rules and regulations to
in the conduct of suits, and not to the articling
admission of proctors, which acts are done on
official principal of the Arches Court, or his s
are registered in the Arches Court. According
sent rules, a candidate for admission as an advocat
to deliver into the office of the vicar-general of

ry a certificate of his having taken the degree of
Civil Law, signed by the registrar of the university
belongs. A petition, praying that in consideration
alification the candidate may be admitted an advo-
n presented to the archbishop, who issues his fiat
nission of the applicant, directed to his vicar-gene-
hereupon causes a rescript or commission to be
addressed to the official principal of the Arches
Canterbury, empowering and requiring him to admit
date an advocate of that court. This commission
proviso that the person to be admitted shall not
r one whole year from the date of his admission.
date is admitted on one of the regular sessions of
a Court; the rescript of the archbishop being first
the oaths of allegiance and supremacy, with two
s, being taken. This admission in the Arches
lifies the person for practising in any of the other
al courts of Doctors' Commons. The present
advocates is twenty-four.

rt of the province of York which corresponds to
of Arches is called the Chancery Court of York.
r of advocates practising in this court has never
ur. They are admitted by fiat of the archbishop,
his chancellor, and have power to practise in all
f the archbishop; but it is not necessary that they
Doctors of Civil Law. (*Parliamentary Paper*,
844.)

IEDEAN SCREW. [Screw Propeller,

RAPH. [Cyclograph, P. C. S.]

OCH, is a lake in Scotland, in the county of
n the parish of Aberfoyle: it lies south of Loch
Katrine, from which it is separated by huge moun-
he summit of which, known as Ben Venu, rises to
00 feet above the sea. On the west the lake is
by high mountains. Ben Lomond, which rises
ove the sea, is only about four miles distant.
two mountain-masses lies Loch Chon, where
th originates. It runs in a narrow valley to Loch
s about two miles long, and on an average less
ile wide. To the south and east of the lake are
ding towards its shores with a moderately gentle
re the river leaves the lake there is a small
w which it runs through a narrow valley, called
to a more level country.

Statistical Account of Scotland.)

K LIMESTONE, a calcareous bed or series
ining shells and fish remains, in the upper part
rmations of Manchester and Lebetwood. There
above it at Manchester.

O, SPINELLO, one of the most distinguished
Italian painters, was born at Arezzo in 1316. He
urname from his birth-place, a common circum-
se times. His father, Luca Spinelli, was a Flo-
settled at Arezzo when the Ghibellines were
n Florence. Aretino was the pupil of Jacopo del
hom however he surpassed even as a boy. He
putation very early by some frescoes illustrating
n Niccolo, which he executed in a new church of
uilt at Arezzo by Dardano Acciajuoli, expressly
ion of a council to be held there by Pope Eugene
hurch was destroyed by fire in the time of Vasari.
however which Aretino painted in it procured
tion from Baroni Capelli, a citizen of Florence, to
ncipal chapel of Santa Maria Maggiore, with sub-
e life of the Virgin, and of Sant' Antonio Abate.
many works also for the Abbot Don Jacopo,
in the monastery of San Miniato, near Florence,
main; others in the monastery of San Bernardo,
nd others in distemper, in the monastery of Monte
Florence. He executed also six of the series of
trating the life of San Ranieri, in the Campo
, which Vasari reckons among his best works;
hing of them now remains, but there are prints of
nio's 'Pitture a Fresco del Campo Santo di Pisa.'
urch at Arezzo which derived its name from a
e Madonna and infant Christ by Spinello; it
l Duomo, or cathedral, and when that church was
the fresco was cut out of the wall, and placed in
h, which was thenceforth called the Madonna
aking the name of the picture.

pal works of Spinello are not mentioned by
are in the town-hall of Siena, and are from the life of Pope Alexander III. Rumohr describes them in his 'Italian Researches.' Aretino was still painting them in 1408, which probably was the year of his death. Vasari says he died about 1400, aged 92; and assuming, upon this authority, that he died aged 92, in 1408, he was born, as mentioned above, in 1316. Vasari accounts for his death in a very singular manner: he says that in a fresco of Michael and the fallen Angels in the church of the brothers of Sant' Angelo at Arezzo, Spinello had painted the archfiend so hideous, that he appeared to Spinello in a dream, and asked him where he had seen him so ugly as he had had the audacity to paint him, which vision, says Vasari, frightened the painter to death. As however these works were painted about 1393, the vision was not so fatal to him. There is a print of the picture in Lasinio's old Florentine paintings. Aretino excelled in expression, and, in the opinion of Vasari, was a better painter than Giotto, and equal to him in design. His sons Forzore and Parri Spinelli placed a tablet to his memory with a very laudatory inscription, in the church of Sant' Agostino at Arezzo; but it has long since disappeared. Forzore was a jeweller; Parri became a very distinguished painter.

(Vasari, *Vite de' Pittori*, &c., and the Notes to Schorn's German translation; Rumohr, *Italienische Forschungen*.)

ARFE, the name of two very distinguished Spanish silversmiths, and the designers and constructors of several of the most costly tabernacles which do or did adorn the cathedrals of Spain.

Henrique de Arfe, the elder, and the grandfather of the other, Juan de Arfe, made, between 1506 and 1524, the silver tabernacles of the cathedrals of Leon, Cordova, and Toledo. The last, which is a Gothic design, and hexagonal, is ornamented with 260 small statues, besides bas-reliefs and other embellishments; it weighs rather more than 5292 ounces. It was gilded by Francisco Merino in 1599. The tabernacle also of the Benedictine monastery of Sahagun, was made by Henrique de Arfe, besides a great many crucifixes and other articles used in Roman worship.

The grandson, Juan de Arfe y Villafane, was born at Leon in 1535; his father Antonio, likewise a silversmith of ability, was his instructor. He is the artist of three of the finest tabernacles in Spain—those of Avila, Seville, and Osmas. That of Seville is the largest and most costly in Spain; it is 12 feet high, and its whole weight in 1668 was rather more than 17,397 ounces. It was completed in 1587, and Arfe himself published an account of it. If he was paid for this tabernacle as he was for that of Avila, reckoning a ducat as two Spanish dollars, he received for it 52,191 dollars, supposing its weight was not increased by some alterations which were made by Juan de Segura in 1668. He made also tabernacles for the cathedrals of Burgos and Valladolid, and one for the church of St. Martin at Madrid. Arfe was much employed by Philip II. and Philip III.; the former appointed him assayer of the Mint of Segovia. The date of his death is not known, but it was subsequent to 1590, for about that time he made the tabernacle of Osmas, in which he was assisted by his son-in-law Lesmes Fernandez del Moral. He was both engraver and writer; he wrote two works connected with the theory of his profession—'Quilatador de Oro, Plata, y Piedras,' Valladolid, 1572; and 'Varia Commensuracion para la Escultura y Arquitectura,' Seville, 1585. Of his engravings are mentioned the illustrations of the 'Caballero Determinado,' translated by Hernando de Acuña from the French of M. Olivier, and printed at Salamanca in 1573; also a portrait in lead of Alonso de Ercilla, in the first edition of his 'Araucana.'

(Ponz, *Viage de España*, &c.; Cean Bermudez, *Diccionario Historico*, &c.)

ARGES (Goldfuss). (Paradoxides bimucronatus of Murchison.)

ARI'STEAS. [Septuagint, P. S.]

ARJONA, MANUEL DE, born June 12, 1761, commenced his studies at the university of Osuna, his native town, and afterwards completed them at that of Seville, where he took his degrees in civil and canon law. Jurisprudence however did not become his professional pursuit, for he entered the church, and was made canon penitentiary in the cathedral of Cordova, and one of the chapter of the chapel royal of San Ferdinand at Seville. It was in this last capacity that he accompanied the Archbishop of Seville to Rome in 1797, when he received from Pius VII. the honorary appointment of one of his private chaplains. To scholastic erudition and classical learning Arjona joined an acquaintance with general literature, and distinguished himself by his efforts to promote a taste for such studies among his countrymen. He was one of the most active and influential members of the Academia de Letras Humanas at Seville, which institution could boast of many of the most intelligent individuals of that period. Although he is chiefly known by his poetical productions, a great number of other literary compositions were found among his papers after his death (July 25, 1820), including several on ecclesiastical history and canon law: among others, his 'Historia de la Iglesia Betica.'

(Quintana, *Tesoro del Parnaso Español.*)

ARKANSAS, which was a territory of the United States of America when the article in P. C. was written, was admitted into the Union as an independent State by an Act of Congress in 1836. The constitution was formed by a convention of delegates, which met on the 1st of January, 1836, and the election of governor, and other officers of the State, was commenced on the 1st of August, 1836.

The Senate consists of not less than 17 members, nor more than 33 (the number in 1844 was 25); the House of Representatives, of not less than 54 members, nor more than 100 (the number in 1844 was 75). Members of the Senate are elected for four years; members of the House of Representatives, for two years. The General Assembly meets every two years. Every white male citizen of the United States, who has been a citizen of the State of Arkansas for six months, is qualified to be an elector. All elections are by open voting. The governor holds office for four years, but is not eligible more than eight years in any period of twelve years. His salary is 2000 dollars per annum.

The judicial power is vested in a supreme court, a circuit court, county courts, and justices of the peace. The supreme Court consists of a chief justice, with a salary of 1800 dollars, and two associate justices, one of whom has a salary of 1800 dollars, the other of 1500 dollars. The judges are elected for eight years, by the General Assembly, by a joint vote of both Houses. The supreme court has appellate jurisdiction only, except in particular cases pointed out by the constitution.

The circuit court consists of seven judges, who are elected by the General Assembly for four years: each judge has his circuit, and a salary of 1000 dollars is paid to some of the judges, and 1200 dollars to others. The circuit court has original jurisdiction in all criminal cases not otherwise provided for by law; and exclusive original jurisdiction of all crimes amounting to felony at the common law; and original jurisdiction in all civil cases not cognizable before justices of the peace; and original jurisdiction in all matters of contract, where the sum in dispute is over 100 dollars.

Justices of the peace are elected by the people, and their term of office is two years. Judges of the county courts are chosen by the justices of the peace.

Slaves cannot be emancipated by the legislature without the consent of their owners. In all trials they have counsel assigned by the court for their defence, a fair trial by jury, and, if convicted, the same punishment as would have been inflicted on a white man. A debtor cannot be imprisoned except where there is strong presumption of fraud. Lotteries are prohibited.

The population of Arkansas in 1820 was 14,273, of whom 1617 were slaves; in 1830 it was 30,388, of whom 4576 were slaves; in 1840 it was 97,574, of whom 19,935 were slaves and 465 coloured freemen. The proportion therefore of whites to slaves was, in 1820, as 1 to ·127; in 1830, as 1 to ·177; and in 1840, as 1 to ·256; so that the proportion of slaves, which in 1820 was rather more than one-eighth, had risen, in 1840, to rather more than one-fourth. In 1840 the number of inhabitants to a square mile was 1·7; in 1830 it was only ·2. In comparison with the other states, Arkansas is the fifth in size, and the twenty-fifth in amount of population. It contains no town of 2000 inhabitants: it sends one representative to Congress, and has three votes in the election of the president. The state debt in 1842 was 2,676,000 dollars, which had been contracted for banking purposes.

Little Rock, the seat of government of Arkansas, is 1068 miles south-west from Washington, the capital of the United States. A few of the houses are of brick, the rest of wood. The population is less than 1000; but it has three cheap weekly newspapers.

(*American Almanac*, 1837, 1844, 1845; Featherstonhaugh's *Excursion through the Slave States.*)

ARLAUD, JACQUES ANTOINE, a very distinguished miniature painter, born at Geneva in 1668. He acquired a great reputation at Paris and at London. In Paris he was the instructor of the Regent Duke of Orleans, and had apartments in the palace of St. Cloud. He came to England in 1721, with letters of introduction to the Prin
afterwards George II., and returned in 1729 to h
try with a fortune of 200,000 francs: he died a
1743, and bequeathed many books, works of art,
various curiosities to the library of that place.
bequest were some pieces of a drawing of a Led
made in Paris, said to have been copied from a ba
Michelangelo. It appears to have been a wonder
ance, and was originally executed for the duke de
12,000 francs, but when it was finished he was u
for it, and it remained in Arlaud's possession; h
part with it, but he copied it for an Englishman f
laud cut up the original in a fit of piety, says W
destroyed it in 1738, but he cut it up anatomically,
the parts in various directions. Arlaud was or
cated for the church; he was a man of general
and was well versed in languages. While in this
formed a friendship with Sir Isaac Newton, who c
with him after his retirement to Geneva. Among
tures which he painted in London was one of th
duke of Marlborough. He painted also one
tender's sisters, upon which Count Hamilton wr
which is in the fourth volume of his works. T
an ode on Arlaud's Leda in the third volume of
of M. de Bar, Amsterdam, 1750.

(Descamps, *La Vie des Peintres Flamand*, &c.
leitung auf die nützlichste und genussvollste Art
zu bereisen; Walpole, *Anecdotes of Painting in*

ARMAGH OBSERVATORY. The Ob
Armagh was endowed and founded in 1791 by
Robinson, the great benefactor and improver
He however died before it was finished; and it w
by his immediate successor, till the present primat
George Beresford, completed and surpassed the ori
It stands north-east of the town, on an eminence
clay, raised about 100 feet above the surrounding
subjacent rock is mountain limestone. At the n
the ground rises about 3′, at a great distance; but
at six miles a hill has 25′ altitude.

From the centre of the dwelling-house a tower
in which a large equatorial, by Troughton, is pla
revolving dome 15 feet in diameter, on an ins
This, which for many years was the only ava
ment, was conceived, by its illustrious maker, t
of supplying the place of a transit and a meridian
this he was of course mistaken; yet it will appear
ence to Mr. Pond's description of the Westbury
results of its observations are given), that it was n
any instrument then existing. Its hour-circle
diameter, and declination-circle of 42, are divid
dots, and read each by a pair of microscopes. U
the telescope has but $2\frac{3}{4}$ inches aperture, and t
little optical power for some of the most importa
equatorial. The clock is by Crossthwaite, with
and a gridiron pendulum.

At the east of the house, but connected with it

1. A calculating-room, containing the observa
a mean-time clock by Skelton, with gridiron pen
machine for polishing specula, on Lord Rosse'
adequate to one of 30 inches aperture.

2. The transit-room, 19 feet by 13, with an ob
ture (or chase) of three, contains a transit ins
Thomas Jones, of 63 inches focal length and 3
This is constructed with tension bars on Troug
but is peculiar in the arrangement of its Ys, whic
ings, 1·5 inches long, faced with quartz, and ha
marked the pivots, after the constant use of 16
counterpoises have been retained; but by their
are prevented from disturbing the meridian p
instrument. Besides the usual circles at the ey
telescope, it has one of 10 inches diameter on the
shows polar distance, and is now exclusively used,
is by the Ertels of Munich, and of admirable q
transit clock is by Earnshaw, and may be reckone
the similar one, which he made for the late Mr.
said to have disappeared. It is jewelled with s
fusion, and its case made as nearly air-tight
mahogany and joints screwed up with waxed clot
which probably it is owing, that after 50 years it
exhibits no trace of wear. It is even wound u
valve. It moving weight is 3 lbs., and its origin
was a gridiron weighing 21; but, as it was not
compensated for temperature, this was changed for

ame weight by the late Mr. Sharpe, in 1830, and
time barometer-tubes were applied, to correct for
density of the atmosphere. Its performance is
l, that its predicted rate will *probably* not differ
ts observed than one-thirtieth of a second.
er contains the magnificent zenith sector, made by
r Sisson, but divided by Bird, which belonged to
observatory of George III. in Richmond Park,
esented to the Primate by her Majesty, along with
er of its instruments. It turns freely in an insu-
ron framing, for the purpose of reversion, and is in
ervation, and of most beautiful workmanship; but,
judicious combination of wood and brass in its struc-
not keep its adjustments: this defect however is
be remedied. The telescope has 4½ inches aper-
re, 6° on each side of the zenith, and 12 feet
divided to 5′ by dots. In the upper story of this
er a sliding roof, is also placed a journeyman time-
a triple 3½ feet achromatic provided with wire, and
ect-glass micrometers.
ircle-room, 15 feet by 13, has a mural circle by
nes, 56 inches diameter, and bearing a telescope
the transit. It is divided on the face next the
alloy of gold, and is read by twelve achromatic
so large that the observer's eye is 35 inches from
, a size chosen to prevent their *run* from chang-
perature. The illumination of them, as well as
(by Earnshaw), and of the spider lines in the
effected by a single light placed in the centre of
me bearing reflectors; and the movements of the
re produced without touching the circle. Un-
ere taken by the artist to ensure the accuracy of
the steel pivots of 6½ and 2½ inches diameter
with a point of diamond, and the graduation has
with extreme care. In this room are also a
tonian, made specially by Sir W. Herschel for
and one of 2 feet focal length and 6 inches aper-
, in excellent preservation, which can be used in
ree forms. These are, when employed, moved
g terrace. It has also a barometer by Newman,
e standard one of the Royal Society; and the
mometer, and other meteorological instruments,
ern window in the passage to the eastern dome.
lso of 15 feet diameter, contains a large reflector
mounted by Mr. Grubb of Dublin. It is 15
re and 112 focal length. It is Cassegrainian,
gher powers; but for sweeping and observing
ewtonian form is preferred, as giving a wider
with a power of 115, is 38′; on good nights the
cts well with 700. Both have wire micrometers
means of illuminating the lines in a dark field.
moving parts of this huge instrument (which,
sit and circle, were the gift of the present Pri-
half a ton, it moves with remarkable facility and
nd, besides the usual tangent movements, has one
nsion, by clockwork, provided with Mr. Grubb's
ich, under favourable circumstances, has kept a
ire for the entire hour during which it goes. The
quatorial are cast-iron, and its circles of 9 and 10
ter are divided to 15′. The hour circle has only
but the other has a pair of micrometer micro-
hich it can identify a star with a probability of
econds. The finder of the telescope is a fine
f 7 feet focus and 3·8 aperture, with powers from
e latter serving to try the favourable state of the
covering the reflector, and also to make observa-
ng the instrumental errors, as the large speculum
evented from shifting a little on reversing.
uminations required about these instruments are
gas-light; the products of combustion are con-
gh the roof, and the eyes of the observer are
n all direct light.
vatory is directed by an astronomer nominated by
and subject, under an Act of Parliament, to a
tors, consisting of his Grace, the dean and chapter
dral, and four elected governors. He has an
is own appointment, and there is a small fund for
the buildings and instruments, but, unfortunately,
lishing the observations.
ants of the observatory are, as far as they have
ermined,

. . . .	54° 21′ 12·7″ north.
. . . .	0h. 26m. 35·5s. west.
Height above base-plane of Ordnance Survey	211·0 feet.
Magnetic variation, Sept. 16, 1833 .	28° 37′ west.
——— Dip, Jan. 1, 1837 . .	70° 40′
——— Intensity	1·0242
Mean temperature	47·76°
Mean barometric pressure . . .	29·669

ARMIN, ROBERT, a favourite comic actor and small author, was a contemporary of Shakspere, and a member of the same company of players. Armin was a pupil of the famous actor Tarleton, who died in 1588: he was in Scotland on one of the visits paid to that country by the English actors: he was one of the players licensed by King James on his accession to the English throne in 1603; and the latest publication that is certainly his appeared in 1609. In the first folio of Shakspere he is named as one of the actors who had played in the great poet's dramas: and an expression of his own, elsewhere, indicates that he was one of those (though certainly not the first) who performed the part of Dogberry. Armin wrote recommendatory prefaces and similar addresses for several pamphlets of his day. His own principal or only works were the following:—1, 'The Italian Taylor and his Boy,' 1609 (re-printed 1810), a novel of Straparola, rendered into doggrel English verse; 2, 'A Nest of Ninnies,' 1608 (re-printed, with a notice of the author, for the Shakspere Society, 1842), which is a collection of anecdotes of fools and jesters, philosophised in the worst taste of the writer's times; 3, 'The History of the Two Maids of Moreclacke,' a drama, printed in 1609.

ARNI'CA, a genus of plants belonging to the natural order Compositæ, the tribe Vernoniaceæ, the sub-tribe Senecioneæ, and the division Eusenecioneæ. It has a cylindrical involucre with equal 2-rowed scales; the flowers of the disk hermaphrodite, tubular, the limb 5-toothed, the stigmas thickened above, and terminated with a conical pubescent apex, the flowers of the ray female bearing degenerated stamens, or with only the rudiments of an anther; the achenium winged and striated; the receptacle naked; the pappus hairy. One species of this genus grows in Europe, the A. montana, and is known by the common name of leopard's-bane. It has oblong-obovate, nearly entire, 5-nerved radical leaves, a few-flowered stem, with villose or glandulose pubescent peduncles and involucres. This plant is not found in the British Isles, but is abundant in the meadows and forests of mountainous districts in the middle and north of Europe, and also on the Alps. It blossoms in June and July.

This plant was at one time admitted into all the British Pharmacopœias, but at the present time is only retained in the Dublin. It does not appear ever to have been much used in this country, and perhaps never sufficiently to refute or confirm the strong recommendations of it by German writers. In Germany all parts of the plant are used, the flowers, leaves, and root. The whole plant, but especially the root, possesses a peculiar aromatic but not pleasant odour, and a nauseous taste. The plant has been examined by various chemists, and in every part there has been found an acrid resin and a volatile oil. In combination with these Chevallier and Lassaigne found in the flowers an acrid bitter principle, which they have called Arnicine, and the root contains a considerable quantity of tannin. In large doses it produces inflammation of the alimentary canal and coma. In small doses it acts as a general stimulant, increasing the pulsations of the heart, and acting as a diaphoretic and diuretic. It is used in Germany in cases of low fever, also in nervous diseases, in amenorrhœa and adynamic diseases generally. The root by means of its tannin acts as a tonic on the system. The root is given in powder in the dose of about ten grains, three times a day, or in infusion. The flowers are used in infusion, in the proportion of one drachm of the flowers to eighty of boiling water, of which two ounces may be given at a dose. In making this infusion care should be taken that the pappus be prevented from getting into it by means of straining through a linen bag. The German Pharmacopœias contain several preparations of arnica, amongst others a tincture, an extract, an essence of the flowers, and a vinegar (acetum arnicæ). Amongst homœopathic practitioners the tincture is applied to wounds and bruises, and other external uses, and infinitesimal doses of this substance are recommended, according to their practice, in many severe diseases.

(Bischoff, *Medicinisch-pharmaceutische Botanik*, 1844; Christison's *Dispensatory*.)

ARNOLD, THOMAS, D.D. The events in the life of this able man and distinguished schoolmaster are comparatively few. Thomas Arnold was born at Cowes, in the Isle of

Wight, June 13, 1795. His father, William Arnold, was collector of the customs in that place, where the family, originally from Lowestoff in Suffolk, had resided for two generations. His education when a child was under the direction of his aunt. At the age of eight he was sent to Warminster, and four years afterwards to Winchester College. As a boy he was remarkably shy and indolent, a character which presented a strong contrast to the frankness and activity of his subsequent life. At school his favourite pursuits were history and poetry. Having written a play, and a long poem after the manner of Scott, he was called Poet Arnold, to distinguish him from another boy of the same name. In 1811, in his sixteenth year, he was removed to Oxford, having obtained a scholarship in Corpus Christi College. Here, stimulated by the love of the real, which was one of the prominent features of his character, he devoted his attention chiefly to the philosophers and historians of antiquity, among whom his favourite authors were Aristotle and Thucydides. He is represented by those who knew him to have been at this time fond of discussion and vehement in argument; fearless in advancing his opinions, and stiff in maintaining them; extremely liberal in his views, which he held with a firm conviction of their truth, but which often startled the Church and State Tories by whom he was surrounded. With this intellectual boldness and independence, he combined no arrogance or conceit; but a disposition so generous and affectionate, that those who differed most widely from him in opinion never failed to respect and love him, many of whom continued his friends to the latest period of his life. In 1814 he took a first class degree, and the year after was elected Fellow of Oriel College. In 1815 and 1817 he was chancellor's prizeman for the Latin and English essays. Having overcome certain scruples respecting some points in the Thirty-nine Articles, with which he appears to have been harassed about the time he graduated, he was ordained deacon in 1818, and priest in 1828, when he undertook the chaplaincy of Rugby School. In 1820 he married Mary, youngest daughter of the Rev. J. Penrose, rector of Fledborough, Notts, having in the previous year settled at Laleham, near Staines, where he employed himself in the preparation of seven or eight young men for the universities. Here a great and decisive change came over his character. The indolence and restlessness by which his early years had been marked, entirely disappeared, and he acquired those settled, serious, earnest views of the nature and purpose of life, which actuated him ever after. It was this 'intense earnestness' which gave him so much power over his pupils, and which roused every one who came within the sphere of his influence to the consciousness that they had powers to cultivate, duties to discharge, and a mission to accomplish. The time which was not occupied with his pupils was devoted to collecting materials for his edition of Thucydides, writing articles on Roman history for the 'Encyclopædia Metropolitana,' and preparing the way for his History of Rome, which he did not live to finish.

In August, 1828, he entered upon his duties as head master of Rugby School, to which he had recently been elected. Here his great talents for instruction and the management of young men acquired a suitable sphere for their activity. The result was soon apparent, not only in the eminence which Rugby rapidly obtained, but in the beneficial change which, by its example, was impressed upon other institutions of a similar nature. Dr. Arnold retained the old classical basis of tuition, but gave it breadth by connecting it with other departments of learning; inspired it with life and vigour by the practical views to which he directed it; and imparted to it elevation and dignity by what had heretofore been wanting in public schools—the introduction of a high moral and Christian element: so that Rugby became in the true sense of the word the seat of an enlightened and Christian education. He treated his pupils with the affection of a friend and the courtesy due to gentlemen, as well as with the authority of a master. As he could not come into frequent personal contact with every one among them, he governed the school, and made his influence felt through the whole of it, by means of the sixth form, or highest class of boys. To add to their authority, and for the sake of maintaining order and government among the boys themselves, he kept up the system of fagging; but he stripped it of its repulsive features and invested it with a moral force, by making it the ground of a solemn responsibility on the part of those who exercised the power. His views on this subject will be found in the 'Journal of Education,' 1834-5, to which there is a Reply by Professor Long, the editor of that work.

In this occupation he spent the last fourteen
life; and during that period, though so diligently
his own proper duties, took the deepest interes
pubiic events and political questions of the time.
of the most decided opponents of the Oxford ne
theology. His idea of a Christian church was fi
his pamphlet on Church Reform, which he was
publish in 1833, in consequence of the apprehen
tertained of the danger which then threatened th
ment. His theory is much the same as Hooker
church and state are identical—that a church is
state. His views on this subject are again stated i
ment on the Church recently published; in which
key-stone of the Tractarian heresy, in attacking w
siders to be their false notions of the Christian pr

In 1835 the office of a Fellowship in the Se
new London University was offered to Dr. Arno
Spring Rice, the Chancellor of the Exchequer, an
was accepted. Dr. Arnold at first consented t
University 'without insisting on a Scriptural exam
the alleged ground of fact, that such an examinati
practicable on account of the objections of differen
Christians, and on the hope, which he distinctly
that the Christian character of the University might
without it.' But he subsequently became con
'the Scriptural examination was both practicable
indispensable, and he gave notice of his intention
mending the introduction of the Scriptures as a
classical examination for every degree.' In Dece
he succeeded in carrying a resolution 'that, as a g
the candidates for the degree of Bachelor of Arts
examination either in one of the Four Gospels or
the Apostles in the original Greek, and also
History.' In consequence of the remonstrances
bodies of Dissenters and from the Council of
College, London, and partly in consequence of
representation of the Secretary of State (Lord Joh
through whom an appeal had been made by the
to the law officers of the Crown, a larger mee
Senate of the University of London was held,
1838, in which the former motion was overrul
its place it was resolved, 'that examination in
text of the Old Testament, and in the Greek
New, and on Scripture History, shall be instit
University; and that all candidates for degrees
if they think proper, undergo such examination.'
immediately proceeded to institute a voluntary
with prizes, in the texts of the Old and New Tes
in Scripture History. Dr. Arnold finally withdr
Senate of the London University, in November,
led, 'after the fullest consideration and inquiry, to
sion that the voluntary examination would not be
(Letter to the Earl of Burlington, Stanley's *Lif*
ii. p. 126), or, as he expresses himself in anothe
the same letter, would not 'satisfy, either pract
theory, those principles which appeared to him in
The history of this transaction is given at length
'Life of Arnold' (ii. p. 10, &c.), and Dr. Arnold
opinions appear from various letters in the same
13, 83, 91, 94, 107, 126). The history of
University is given in P. C. [UNIVERSITY OF Lo
the various documents about the examination
subjects in that university are contained in
mentary Papers (No. 598) relative to the U
London, printed by order of the House of Comm
(pp. 26, 27).

Dr. Arnold's mind was early directed to the soci
of the working classes of this country; and many
made, and a variety of plans devised by him, n
improving it, but for directing the attention of th
a subject of so much importance. For this purp
lectures at the Rugby Mechanics' Institute, start
paper in 1831 expressly for the use of the lower
in the same year, and also in 1832, wrote let
'Sheffield Courant' and subsequently in the
former.' He was one of the first to perceive the
introducing a moral element into the measures i
the social benefit of the masses; without which th
of the franchise would be useless, if not pernicious

The Whigs, to which party he was more nearly as
opinion than to any other, offered him some prefer
he did not accept. The year before his death, h
was appointed by Lord Melbourne to the regius-pr

history at Oxford—an appointment which gave
st lively satisfaction. But he lived to deliver
roductory course of lectures. When at the very
is reputation as a teacher, and at the time when the
hich, for the liberality of his religious and political
is name had been held by men of his own pro-
fast disappearing, and the grandeur of his charac-
ry day becoming more manifest and more distinctly
, he was seized with a fatal disease, which carried
a few hours. He died on the 12th of June,
he close of the half-year, of spasm at the heart, and
in the chapel at Rugby. If he had lived another
ald have entered upon his 48th year. He left a
ith five sons and four daughters. It is intended to
larships to his honour, bearing his name, the means
have been already raised.
espondence is the best record of his life, and affords
ivid representation of his character. It presents
progressive development of his mind and views,
reaches the vigour and the other the comprehen-
which at length they became distinguished. He
he intellectual and the moral in a degree and with
arely found. The most strongly marked feature of
was the strength and clearness of his conceptions.
ke the possession of an inward light, so intense
rated on the instant every subject laid before him,
him to grasp it with the vividness of sense and
reality. Hence what was said of his religious
ay be used to characterize his intellectual opera-
knew what others only believed; he saw what
talked about.' Hence also perhaps arose in a
e the vehemence with which he opposed views
ontrary to his own. Of his moral nature, honesty
ess, earnestness and love of truth and justice,
minent qualities. And though these were cal-
re an aspect of sternness to the outline of his
t they were tempered with an expansive bene-
combined with a tenderness of disposition, which
an object of the most devoted attachment to
. It was said by one who knew him well, that
family as if he had no friends, his friends as if
ily, and his country as if he had neither family

work, and the one by which he will be remem-
three volumes of Roman History, comprehend-
d between the origin of the state and the end of
unic War. To these another volume is to be
rising his contributions to the 'Encyclopædia
a,' and carrying on the History to the time of
he Notes and Dissertations to his edition of Thu-
as given a social and political as well as a critical
author. History and divinity—man and man's
od—were his favourite studies. In both he pre-
actical to the theoretical. His five volumes of
onstrate with what earnestness and devotion he
ring religion into the daily concerns of men, and
y act of life with a Christian character.
ing productions are—a volume of Lectures on
ory, delivered at Oxford; pamphlets on a variety
rticles in several reviews; together with a post-
on the Church. To these it is understood that
Essays will be added.
ife and Correspondence of Dr. Arnold, 4th ed.)
[Arrest, P. C.] With regard to arrest on
ss, the law has been materially altered by the
Vict. c. 110, §§ 2, 3, 4, 5, 6. Since that statute
ons, except the three real actions which still
be commenced by Writ of Summons, and no
be arrested before a judgment has been ob-
him, unless it be shown by the affidavit of the
some other person, to the satisfaction of a judge
superior courts, that such plaintiff has a cause of
the defendant to the amount of 20*l*. or upwards,
ed damage to that amount, and that there is pro-
for believing that the defendant is about to quit
ss he be forthwith apprehended. The judge is
ed to issue a writ of Capias against such defend-
eedings upon such writ are the same as they were
rit of Capias, which formerly was used as the
nt of all personal actions which were commenced
r courts of common law, when the object was to
n or hold him to bail. [Capias, P. C.]
ation to the judge may be made and the defendant arrested at any time after the commencement of the action and before final judgment shall have been obtained therein.

The statute 7 & 8 Vict. c. 96, has also effected a very important alteration in arrest on final process or in execution. The 57th section enacts that no person shall be taken or charged in execution upon any judgment obtained in any of her majesty's superior courts, or in any county court, court of requests, or other inferior court, in any action for the recovery of any debt wherein the sum recovered shall not exceed the sum of 20*l*. exclusive of the costs recovered by such judgment.

And the 58th section has a retrospective effect, empowering all persons in execution at the time of the passing of the act on any judgment in any action of debt, wherein the debt, exclusive of the costs, did not exceed 20*l*., to apply to a judge to be forthwith discharged out of custody; the judgment however is still to remain in force after the discharge of the debtor, and the creditors may have their remedy by execution against his property and effects.

Certain personages were from the earliest times privileged from arrest or civil process; either entirely so, or temporarily. A list of them is given in Blackstone's *Comm.* vol. iii. Lee's ed. note 23.

ARREST OF JUDGMENT. After an action at law has been carried through all the stages previous to the judgment, and the plaintiff has up to this point been successful, the defendant may still move in arrest of judgment: that is, he may pray the court to withhold or arrest the judgment from the plaintiff, on the ground that there is some error appearing on the face of the record, which vitiates the proceedings. In consequence of such error, on whatever part of the record it may arise, from the commencement of the suit to this period, the court is bound to arrest the judgment. The error must be such as is apparent on the record: and generally speaking, it must not be an error in a mere point of form. This was formerly otherwise; but certain statutes have been passed at different periods, called the statues of jeofails and amendments, by the effect of which judgments at the present day cannot, in general, be arrested for any merely formal objection. (The statutes of jeofails and amendments are 14 Ed. III. c. 6; 9 Hen. V. c. 4; 4 Hen. VI. c. 3; 8 Hen. VI. c. 12, 15; 32 Hen. VIII. c. 30; 18 Eliz. c. 14; 21 Jac. I. c. 13; 16 & 17 Car. II. c. 8; 4 & 5 Ann. c. 16; 9 Ann. c. 20; 5 Geo. I. c. 13.)

For further information on this matter, see Blackstone's *Comm.* iii. ch. 24; Stephen *On Pleading*; Comyn's *Dig.*, tit. 'Pleader,' § 48.)

ARRESTMENT in the law of Scotland is a process by which a creditor may attach money or moveable property which a third party holds for behoof of his debtor. It bears a general resemblance to foreign attachment by the custom of London. [Attachment, Foreign, P.C., p. 50.] The person who uses it is called the arrestor; he in whose hands it is used is called the arrestee, and the debtor is called the common debtor. It is of two kinds, arrestment in execution and arrestment in security. The former can proceed only on the decree of a court, on a deed which contains a clause of registration for execution, or on one of those documents, such as bills of exchange and promissory notes, which by the practice of Scotland are placed in the same position as deeds having a clause of registration. Arrestment in security is generally an incidental procedure in an action for the constitution of a debt; but it may be obtained from the Bill Chamber of the Court of Session on cause shown, as a method of constituting a security for a debt not yet due. This latter class of arrestments is under the equitable control of the judge who issues it; and it is a general principle that it cannot be obtained unless the claimant show that circumstances have occurred which have a tendency to make his chance of payment less than it was at the time when he entered into the engagement with his debtor. An arrestment may be recalled on it being shown that it should not have been issued, and an arrestment in security may be 'loosed' on the debtor finding security for the payment of his debt. An arrestment in execution expires on the lapse of three years from the date of its execution, and an arrestment in security, on the lapse of three years from the day when the debt becomes due. In the meantime, the person in whose hands the process is used, is liable in damages if he part with the property arrested, but it cannot be attached after he has parted with it, in the hands of a *bonâ fide* holder. The arrestment is made effectual for the payment of the debt by an action of Forthcoming, in which the common debtor is cited. It concludes for payment of the money if the arrestment be laid on money, or for their sale for behoof of the creditor, if it be laid on other moveable goods. The arrestee may plead against the arrestor whatever defence he might have had against the common debtor. The authority of the local courts was enlarged in regard to arrestments, and the process was generally regulated, by the 1 & 2 Vict. c. 114. The practice on this subject will be found in Darling's 'Powers and Duties of Messengers-at-Arms.'

ARRIA'ZA, JUAN BAUTISTA, one of the most noted modern Spanish poets, was born at Madrid in 1770. After his first studies at the seminary of nobles in that capital, he entered the military college at Segovia, and on quitting it began to serve in the navy; but owing to some disorder which produced an incurable defect of vision he was obliged to renounce that career in 1798, previously to which he had displayed his literary talents in a poem on the last Duke of Alba (1796), and an anonymous volume of poetry, entitled 'Primicias,' 1797. Upon giving up the naval profession, he came to England in quality of secretary to the Spanish embassy, and while in this country he completed his 'Emilia,' a poem of the didactic descriptive class, chiefly with reference to the fine arts and their influence (published at Madrid, 1803). After spending about two years at Paris, he returned home in 1807, just before the breaking out of the revolution in Spain, when taking an active part in politics, he declared himself a decided and uncompromising supporter of legitimate monarchy, and the staunch opponent of the Afrancesados, and of the Cortes, whom he attacked in his literary as well as in his political capacity, both in verse and prose, first in his 'Poesias Patrioticas,' wherein he adjured his countrymen to maintain their national independence; next in his 'Discursos Politicos.' This zeal in behalf of monarchy and legitimacy did not pass unrewarded by Ferdinand VII., who bestowed on him various marks of favour, and among other appointments that of secretary of council; also a post in the ministry for foreign affairs. He died at Madrid in 1837.

As a poet Arriaza stands very high among contemporary Spanish authors, especially in point of popularity, for six editions of his poems, exclusive of a Paris one, appeared in his lifetime. Much of their success is no doubt to be attributed to the public sympathy which they excited by strongly appealing to feelings of patriotism; yet independently of such interest they are remarkable for felicity of style and beauty of versification.

(*Conv.-Lexicon der Gegenwart*; Ochoa, *Apuntes*.)

ART-UNIONS. In the Report issued in 1836 by a Select Committee of the House of Commons, which had been appointed in the preceding year 'to inquire into the best means of extending a knowledge of the arts, and of the principles of design, among the people (especially the manufacturing population) of the country,' and 'to inquire into the constitution, management, and effects of institutions connected with the arts,' it is observed that among exhibitions connected with the encouragement of art, the attention of the Committee had been called to the institutions established in Germany under the name of 'Kunst-Vereine,' and which were even then being introduced into this country. 'These associations, for the purchase of pictures to be distributed by lot,' observe the Committee, 'form one of the many instances in the present age of the advantages of combination. The smallness of the contribution required brings together a large mass of subscribers, many of whom without such a system of association would never have been patrons of the arts.' The Committee further remark that the Germans Waagen and Von Klenze, two of the witnesses examined by them, highly estimated the advantages conferred on the arts by such associations, which, according to Waagen, were introduced into Prussia about the year 1825, under the patronage of the king and his minister Von Humboldt.

Down to the time at which this Report was published, such associations had made comparatively little progress in this country; but shortly after its appearance a number of gentlemen, among whom were Mr. Ewart, the chairman of the Select Committee referred to, and four other members of parliament, established a society under the name of 'The Art-Union of London,' which immediately obtained considerable support, and which has since increased to a magnitude far greater than that of any kindred association. The professed objects of this institution are 'to aid in extending the love of the Arts of Design within the United Kingdom, and to give encouragement to Artists beyond that afforded by the patronage of individuals;' and the mode in which these objects are attained is briefly as follows:—Every member of the association subscribes annually the sum of 21*s.* or upwards, those
who choose to subscribe two, three, four, five, or
that amount being considered to hold a proportio
of shares in the prospective benefits; and, on th
the annual subscription-list, which takes place
spring, the Committee of management set apart
the aggregate sum for the purpose of engraving
some work of art, a copy of which is given to eve
for each guinea subscribed. By the combinatio
great number of persons to subscribe for this one
and the avoidance of risk, incidental expenses, an
profits, this print, though at least equal to wh
charged a guinea in the ordinary course of trade
to the subscribers at so small a cost as to leav
greater part of the sum subscribed, as a fund app
purchase of pictures, sculpture, and other works
sum is divided by the committee into several
prizes, ranging from 10*l.* to 400*l.*, and on the
for the annual meeting of the society these priz
buted among the subscribers by a process re
drawing of a lottery, which gives an equal chan
guinea subscribed. The prizeholders are the
select works of art to the value of their respectiv
any of the five annual exhibitions of works of a
tropolis, for the current year, which works, whe
the prizeholders, are purchased and paid for by th
who, at the close of the exhibitions, collect the
sculptures together, and exhibit them gratuito
weeks, first to the subscribers and their friends, a
to the public. When the selected works fall
amount of the prize, the difference is carried by t
to the Reserved Fund of the association, and w
ceed it, the difference is paid by the prizeholder
of the funds is also applied to the offering of
original designs, and the production of bronzes
The amount of subscriptions in the first year,
in 1837, was 489*l.* 6*s.*, but it has increased so ra
last Report, that for 1844, shows a subscription o
of which 8590*l.* was set apart for the purchas
art, being divided into 253 prizes of various
addition to which every subscriber has received
outline illustrations of the 'Pilgrim's Progress,'
premiums offered by the society, and will also
pletion, receive an impression of a line engravi
rate artist from a landscape by Stanfield. The
bition of prizes, or selected pictures, affords anot
means of fostering a national love of art; that of
was open for four weeks, during which it w
nearly 200,000 persons.

The success of the 'Art-Union of London' h
to many similar associations, one of which has
the promotion of the fine arts in Ireland. In th
others, the works of art are selected by the com
selves, and afterwards divided by lot. The pop
Art-Unions, properly so called, has also brought
several lotteries for the disposal of works of
notwithstanding the adoption of a similar course o
the principle is essentially different, such bein
by many persons as mere revivals of a species
speculation which has long been illegal in
and, notwithstanding the opinions of some em
in favour of the legality of Art-Unions, the
dissociating them from lotteries unquestionabl
government to issue a notice in April, 1844, w
effect of suspending their operations for some
parliamentary committee was subsequently
inquire into the subject, with a view to placin
safe and permanent basis, and so rendering them
as possible 'to the improvement and diffusion o
the different classes of the community;' but, as
gations of this Committee could not be brought
time for introducing a bill for their regulation i
of 1844, a short act was passed to indemnify
against such penalties as they might be consider
for one year, so as to allow their proceedings
diately resumed, and the money then in hand to
before the close of the exhibitions for the year; an
stood that early in the present session (1845) a
introduced to carry out the objects for which th
was appointed.

ARTEMI'SIA ABSINTHIUM (Wormwo
cal Properties of. This indigenous perennial
with on waste places, but what is required for m
mostly cultivated. The upper part of the ste

unexpanded flowers, should be collected, for these
ss the peculiar aroma, with a strong bitter taste';
lower part of the stem is merely aromatic, and
itterness. (Geiger.) It imparts its properties to
lcohol, and to fermented liquids. The medicinal
t are—the watery infusion (best made with cold
d the extract: but the domestic preparations are
; these are made either by digesting it with alcohol,
a tincture, or by distilling it with spirits—that
in this last way from Switzerland is termed 'Eau
e, and is a favourite liqueur, which becomes milky on
on of water; it is also steeped in wines (Wermuth),
ndered a constituent of the wine at the time of fer-
it (WINES, P. C., vol. xxvii. p. 465), or drunk in
ntity while using any of the sweet wines, such
y. This practice may have been derived from
ns, most of whose wines were very rich and
nd who used wormwood, both before and after
ne, to counteract the effects. (Paulus Aegineta.) In
of England it is frequently steeped in cider, to
by persons disposed to calculous complaints: a most
roceeding. Elsewhere it is steeped in ale. In the
urope it is used as a substitute for hops in the pre-
beer, and is nearly as good, as a little of it will
ither beer or weak wines when ready to turn.
is by Heyne of 100 parts of the dried plant
composition—volatile oil ?, bitter extractive
y mucilage 15·1, resin soluble in aether 8·6,
ble in aether 3·4. The rest consists of woody
, and loss. Braconnot analyzed the watery ex-
ound—volatile oil 0·15, green resin 0·50, bitter
, albumen 1·250, starch 0·133, azotized matter
r azotized matter 3·0, woody fibre 10·833, absin-
tash 0·333, sulphate of potash and chloride of
races; water 61·2. Recently a peculiar principle
onine, crystallizable, colourless, and almost tasteless,
possess very valuable anthelmintic properties, has
ed from several species of artimesia, particularly
, but whether it exists in A. Absinthium is unde-
The Chemist, vol. v. pp. 36, 91.) The so-called
nwood is merely the impure carbonate of potash,
m the incineration of this plant, which is very rich
salt.

od possesses the properties common to aromatic
it seems to possess also some peculiar ones ren-
orthy of more attention than it receives—neglect
us remedies being prevalent in all ages. The
iple is readily absorbed, so that the flesh of
upon it becomes manifestly bitter; some have
a narcotic power exists in it, and that the milk of
nurses, to whom wormwood is given, is noxious to
his is not clearly proved, nor is it certain that ale
ormwood has been steeped (purl) is more heady
ale. Absinthium greatly increases the appetite,
es digestion, particularly in torpid systems and
constitutions. Those who, by excess, have im-
stomachs, have recourse to wormwood to renovate
s. Hence the demand among gourmands for the
preparations, such as the Crême d'Absinthe.
e is much gastric irritation or vascular excitement
improper. An infusion (made with cold water)
n to consumptive patients, if no inflammatory state
exists, with very great advantage, especially if
phuric acid be added.

O'PTERUS, a fossil fish from the lias near
Agassiz.)

LES (Ecclesiastical Law). [ALLEGATION, ECCLE-
P. C. S.]

LES OF THE PEACE, a term applied to a
e or obligation to the king, entered on record, and
me court by some judicial officer, whereby the
owledge themselves to be indebted to the crown
required, with condition to be void and of none
party shall appear in court on such a day, and in
ne shall keep the peace. (Blackstone, *Comm.* iv.
n's *Justice*.)

LES OF WAR. [MUTINY ACT, P. C.]

CIAL HORIZON is generally a cylindrical cup
inches in diameter, or a rectangular trough, either
ut half an inch deep and containing quicksilver.
plate of glass, whose surfaces should be accurately
ne another, is laid on the surface of the quicksilver
drical cup, but the trough is usually covered by a roof with two inclined planes, each of which is a frame carrying a plate of glass with parallel surfaces. By these means the wind is prevented from agitating the fluid.

The surface of the quicksilver being considered as a plane perpendicular to a diameter of the earth, or rather to a normal, at the place of the observer, is parallel to the rational horizon of that place; and consequently the angle between the plane of the quicksilver and a visual ray from the object to that plane, when corrected for refraction and parallax, is equal to the angular elevation of the object above the true horizon of the place.

Artificial horizons of the kind just mentioned are generally used on land for the purpose of obtaining the altitude of a celestial body by means of an octant, sextant, or reflecting circle, either held in the hands or supported on a small pillar; occasionally also it is employed to obtain the angular elevation of a terrestrial object, as the top of a tower, a mountain, &c. The rays of light from the object, falling on the quicksilver, are reflected from thence to the eye of the observer; and, by the laws of reflexion, the angles made with the reflecting surface by the incident and reflected rays are equal to one another; hence the reflected image of the object appears as much below the horizon, or surface of the quicksilver, as the object itself is above it; and on bringing, by the motion of the index of the sextant, the direct and reflected images to coincide, the angle read on the arc will, the eye being very near the quicksilver, be equal to twice the angle of elevation.

In a regular observatory, the trough containing the quicksilver is, sometimes, several feet long, in order to avoid as much as possible the necessity of changing its place according to the distance of the celestial body from the zenith.

When the atmosphere is very calm, water under a glass-roof may be used instead of quicksilver, but almost the least agitation of the air is sufficient to disturb the reflected image.

On a journey the conveyance of quicksilver is often inconvenient; and therefore scientific travellers have attempted to use, as an artificial horizon, a circular plate of polished metal, or a dark glass, from which light may be reflected as from a mirror. The horizontality of such an instrument is ascertained by means of a spirit-level placed upon it, and the adjustment is effected by three screws which pass through the frame of the mirror at equal distances from one another.

Since, with the usual reflecting instruments, double altitudes exceeding about 120 degrees cannot be observed, the artificial horizon just described would be useless, if the altitude of the object were greater than 60 degrees; they can however be employed with instruments similar to those invented by Captains Fitzroy and Beechey, by which angles exceeding 180 degrees may be observed.

The artificial horizons permit very accurate observations to be made on land, but it is evident that they cannot be used at sea, even though well suspended in jimbals, on account of the unsteady motion of the ship; and some means of enabling a seaman to observe correctly the altitudes of celestial bodies when the sea-line is invisible, or but faintly seen through the vapours near the horizon, is still a desideratum.

It is known however that when a conical or a cylindrical body terminating at the lower extremity in a point is caused to revolve rapidly on its axis, that axis soon takes, and for at least half an hour maintains, a vertical position; and efforts have been made to employ such a body, having a mirror on its upper surface, as an artificial horizon on board a ship. A 'Nautical Top,' as it was called, was proposed by a Mr. Serson, and is described in the 'Philosophical Transactions' for 1750; but, on being tried at sea, its irregularity was found to be great, and the contrivance was abandoned. The late Mr. Troughton however, in 1818, made considerable improvements on the original construction, but his success was not such as to render the machine available. He made the *top* at first cylindrical, but he afterwards gave it the form of a frustum of a cone; the reflecting plane formed the upper surface, and immediately under this was a stem terminating below in a steel point, which rested on the concave surface of a small steel cup. A rapid motion was communicated to the machine by a series of wheels, of which the first was turned by means of a handle on its circumference.

The only contrivance which appears likely to serve the purpose of an artificial horizon at sea is a spirit-level applied to the face of an octant or sextant; and an instrument of this kind was proposed and executed by Troughton. The spirit-level, in a brass tube, was placed between the index and horizon glasses; and, through a perforation in the tube, the observer could see in the horizon-glass the reflected image of the bubble of air: a line was traced on the horizon-glass, and a contact of the limb, or centre, of the celestial body was to be made on this line at the instant that the latter appeared to bisect the reflected image of the bubble. The arc passed over by the index would then express the altitude of the celestial body above the horizon. Instruments very similar to this have been executed by Mr. Robinson, and, for merely nautical observations, they possess sufficient accuracy; the altitudes obtained with them being within two or three minutes of their true values.

ARTILLERY, APPLICATION OF. [Tactics, P. C.]

ARTI'SIA (Presl). This name is equivalent to Sternbergia, P. C. S. At present the opinion prevails that this is an internal portion of another plant, and not a palm-stem, as once conjectured. Coal formation.

ARTOTYRITES. [Communion, P. C.]

ARZOBISPO, YSLAS DEL, sometimes called Bonin Islands, are a group of islands in the Pacific, situated south of the Japanese island of Niphon, between 26° 30′ and 27° 45′ N. lat. and 141° and 143° E. long., but this group has not yet been well examined, and it is supposed that it extends a little farther to the south. It consists of three clusters of islands, extending nearly due south and north. The northern cluster is composed of numerous small islands and pointed rocks, and has much broken ground about it, so that it can only be approached with great caution. This cluster is called Parry's Group. The middle, or Peel's Group, consists of three islands of moderate size. The largest, Peel's Island, is four miles and a half long. The whole group occupies nine miles in length. The southern group is called Baily's Group. The islands are of volcanic origin and surrounded by deep water. They rise from the water's edge with a steep ascent, but not to a great elevation. Between the mountain-masses are small valleys, almost every one of which contains a stream of water. The declivities of the mountains to the very top are clothed with large forest-trees, among which the Areca oleracea and fan-palms are most conspicuous. The shores of the small bays, which are numerous, are lined with ledges and coral reefs. During the winter the wind is from the north and north-west, and is attended with rains and gales; in summer it blows from south and south-east, and the weather is fine, but even then the air is moist, and the islands at sunrise are involved in dense fogs. The animals are—vampires of a large size, herons, plovers, snipes, rails, wood-pigeons, the common black crow, and some smaller birds. There are several kinds of fish, and sharks are very numerous; there are also crayfish and other shell-fish. Green turtles are so numerous as to cover nearly the flat sandy beeches of the small inlets: they weigh from 300 to 400 pounds. Captain Beechey found there two English sailors, who had grown pumpkins, water-melons, potatoes, sweet potatoes, and fricoli beans; they had also planted some cocoa-nut trees, and kept hogs and pigeons. It appears that the islands were discovered by the Spaniards, but it is not known at what time. The whalers in the Pacific go from time to time there to take in water, and get a supply of fresh provisions by killing turtles. It does not appear that these islands have ever been regularly settled by any nation. On the western side of Peel's Island is a small but good harbour, called Lloyd's Harbour; it is surrounded by high hills, and is apparently the crater of an extinct volcano. On the eastern side of the same island is Fitton Bay, which is rather large, but open to the south-east, so as to be unsafe during the south-eastern winds, which prevail in summer.

(Beechey, *Narrative of a Voyage to the Pacific.*)

A'SAPHUS (Brongniart), a very extensive genus of fossil Crustacea (Trilobites), most abundant in the lower Palæozoic strata. Asaphus Buchii marks the Cambrian or lower Silurian, as A. caudatus is frequent in the upper Silurian beds.

ASCA'RIDES. [Entozoa, P. C.]

ASCLE'PIAS, a genus of plants, the type of the natural order Asclepiadeæ. [Asclepiadeæ, P. C.] Many of the species possess powerful medicinal qualities, and hence the name of the genus from Æsculapius (Asclepios), the god of medicine. The genus is characterised by possessing a reflexed 5-parted corolla; a 5-leaved corona seated on the upper part of the tube of the filaments; the leaflets cucullate, having a horn-formed process protruding from the bottom; the anthers terminated by a membrane; pollen masses compressed, fixed by the tapering tops, pendulous; the stigma depressed; the follicles smooth; the seeds coarse. Most of the species are North American herbs, with opposite, alternate, or verticillate leaves.

A. Syriaca, Syrian Swallow-wort, has simple stems with lanceolate oblong or oval leaves, gradually
tose beneath; drooping umbels. Lamar
native country of this plant is Syria and
taries or leaflets of the corona, like some o
clepias, act as fly-traps. The sap of this
contains a considerable quantity of caoutch
recommended as an expectorant. The seed
down, which it was at one time proposed t
for wearing apparel; it is however more
mattresses and pillows.

A. Curassavica, Bastard Ipecacuanha,
with oblong-lanceolate glabrous leaves tape
umbels erect, solitary, lateral. It is a
Essequibo, Cumana, and Trinidad. Its r
sent to England as Ipecacuanha. The
Indies is reputed to be anthelmintic and
dried and powdered acts as an emetic, but
as the root of the true Ipecacuanha (*Cepha*
The roots of *A. prolifera* are also emetic.

A. tuberosa, Tuberous Swallow-wort, h
very hairy, and branched at top; scattered
hairy leaves; umbels disposed in a termina
is a native of North America, in stony place
The roots are famed for diaphoretic properti
it is used for this purpose in inflammatory
ticularly in pleuritis and dysentery. The
some authors is probably only a variety of
has the same properties.

Many other species of this genus are us
the countries where they grow. The bu
are eaten by the shepherds of Arabia aft
asparagus in this country. The whole p
may be eaten. *A. gigantea,* an East Indi
poisonous. 'It kills cattle which eat it, but
du medicine in typhus fever. The milky
is quite innocuous, and is drunk in India as
whilst, on the other hand, the milk of *A. la*
cera, is acrid and irritating. The juice
used with butter and lard as an ointment f
A. procera is applied to hides for removi
tanning. The *A. asthmatica* and *A. vince*
active properties, and are now included
Cynanchum. [Cynanchum, P. C. S.]

Many of the species of Asclepias are
flowers, and worthy of cultivation. They
earth, or a light rich soil of any kind. T
gated by dividing the root in the spring,
seed. Many of the species will require
roots during severe winters. The tropic
species require the ordinary treatment o
greenhouse plants.

(Don, *Gardener's Dictionary;* Burnett
tany.)

ASH. [Fraxinus, P. C.]

ASPEN. [Salicaceæ, P. C.]

ASPERGILLUS. [Byssoideæ, P. C.

ASPHALTE. The use of street-pav
asphaltic or bituminous compounds, and
commonly known as the asphalte, or as
Seyssel, which was introduced into this co
ridge, under a patent obtained in 1837, is
in the article Road (P. C. vol. xx. p. 36)
which such pavements have made in publi
last few years has been less than might hav
doubtless owing, in some degree, to the use
of similar character, and to failures arising
which nothing but experience could point
ever comparatively little has been done in
asphalte to street-pavements, it has been br
sively into use for foot-pavements in less
such as the platforms of railway-stations, fo
and protecting buildings in various ways fr
As it is capable of being usefully adopted i
no other means would be effectual, it may
briefly the mode of applying it to such pur
has shown it to be most suitable for, as po
phlet recently published, entitled 'Instruct
the Seyssel Asphaltic Mastic,' which conta
directions for the preparation and use of the
representations of the necessary apparat
enable persons unconnected with the comp
asphate has been brought into use to mak
lations, and to suoerintend its application.

The principal ingredient of the asphaltic mastic termed Seyssel Asphalte, is a dark brown bituminous limestone, found near the Jura Mountains. This stone is broken to powder and mixed with a portion of mineral tar, when intended for fine work, such as the covering of roofs and arches, the lining of tanks, and application as cement; or, when intended for the coarser purposes of pavement and flooring, with mineral tar and sea-grit; and the whole is exposed for several hours to a strong heat, in large caldrons, until the ingredients, which are continually stirred by machinery, are perfectly united. The mastic is then run into moulds about eighteen inches square and six inches deep, so as to form it into cakes or blocks weighing from 112 lbs. to 130 lbs. each. In this state the asphalte is delivered for use, and portable furnaces and caldrons are provided for re-melting it upon the spot by fires of wood or coke. In this operation 1 lb. of mineral tar is first put into the caldron or boiler, to which, as soon as melted, 56 lbs. of mastic, broken into pieces of not more than 1 lb. each, are added, the whole being stirred together with an iron instrument, formed something like a spoon with the centre of the bowl cut away, so as to reduce it to an oblong loop, and curved in such a way that the stirrer may pass the instrument close to the sides and bottom of the caldron, and lift the portions of mastic in contact with them to the surface, to prevent burning and ensure the perfect mixture of the ingredients. The caldron is then covered over, and a brisk fire kept up for a quarter of an hour, after which 56 lbs. more of mastic are added and stirred in. The caldron is again covered for a few minutes, and further quantities of tar and mastic are added, in the proportion of 1 lb. of the former to 112 lbs. of the latter, till the caldron is full, and the whole is completely melted and fit for use, which will be indicated by the emission of jets of light smoke from the mastic, which will drop freely from the stirring instrument. It should be observed that for this purpose, as well as for the original mixing of the asphalte, only the best *mineral* tar, resembling that with which the limestone is impregnated, should be used; and also that where the mastic needs to be very stiff, as for kitchen-floors, or for use in tropical climates, a less proportion of tar than the above should be used. In such cases also a larger quantity of grit than usual may be mixed with the mastic; and whenever it is desired to convert fine asphalte into coarse, it may be done by mixing, at the time of melting, 30 lbs. of fine clean grit to every 112 lbs. of mastic, increasing, at the same time, the proportion of tar from 1 lb. to 2½ lbs. for every 112 lbs. When ready for use, the melted mastic should be carried very quickly to the spot where it is to be applied, either in iron ladles, or, if it be necessary to remove it to a greater distance, in heated iron buckets. In all cases however it is desirable to have the caldron as close to the work as possible; and in covering brick arches or arched roofs, it may be hoisted to the top of the building, care being taken, whenever it is necessary to set it upon an asphalted part, to lay a few inches thickness of sand and a double row of bricks to support it, and shelter the finished work from injury.

The method of laying foot and carriage pavements in asphalte having been noticed in Road, P. C., it is sufficient to advert to the necessity of securing a firm solid foundation, which, whenever the ground is soft, must be accomplished by ramming, or by removing the soft earth, and substituting a coarse concrete, consisting of seven parts of river-sand or gravel and one part of grey stone-lime, ground to a fine powder. These materials should be dry, and when mixed, only sufficient water should be added to moisten the mass, which must be immediately thrown into place, levelled, and rammed solid. A much finer concrete should then be floated over the surface to fill in the pores, and the whole should be allowed to dry before laying the asphalte, which, if this precaution be neglected, is liable to be full of air-holes, in consequence of its heat converting the moisture of the concrete into vapour. The risk of such failure may be diminished by sifting fine cinder-dust over the concrete when dampness is suspected; and in rainy weather, if the work cannot be protected with tarpauling, which is highly desirable, injury may be prevented by laying sheets of brown paper, tarred on the under side, between the concrete and the asphalte. The thickness of the coat of asphalte is regulated by gauges or slips of wood, which are laid down so as to divide the pavement into compartments, seldom exceeding, where but one person is employed to spread the asphalte, thirty inches wide (though in very extensive works the layers or portions of asphalte may be double that width, and two spreaders may work together), and the composition is levelled by a curved wooden spatula, with the assistance of what is called a floating rule, which is a long straight piece of wood stretching across the layer of asphalte, over which it is moved with a sawing, or backward and forward motion, and resting upon the gauges. If the surface is intended to be smooth, a fine powder, consisting either of equal parts of silver-sand and slate-dust, or of two parts of silver-sand to one of dead plaster of Paris or powdered chalk, is sifted over it before the asphalte is perfectly set, and rubbed in with a heavy flat piece of wood; but where a rough surface is desired, clean sharp grit is very thinly sifted over in like manner, and beaten into the mastic with a flat wooden beater or block, worked with both hands. The grit will adhere better if heated before its application. When one layer or compartment of the pavement is complete, it is well to proceed to the next but one, leaving the intermediate space to be filled in afterwards, so as to avoid the necessity of treading or kneeling upon the finished part until it be perfectly cold and firm. In laying asphalte pavements, whether in streets or in buildings, it is well to increase the thickness a little in places most exposed to wear; thus, the wheel-tracks in coach-houses, and road-ways which are so narrow as to admit but one vehicle at a time; those parts of stable-floors exposed to the trampling of the horse's hind legs; the standing-places for the legs of iron bedsteads in barrack-floors, and other places similarly exposed, should be laid thickly, and with very stiff asphalte. In laying asphalte pavements upon suspension-bridges, or in other situations exposed to much vibration, a sheet of thin canvass laid evenly upon the surface of the concrete, and secured with nails, may be found useful. The concrete may in such cases be laid on a planked flooring, the joints of the floor being covered by battens, nailed at one edge only, to allow the necessary play. Though well adapted for the floors of kitchens, workshops, &c., asphalte does not form an eligible pavement for situations exposed to great heat, or for places in which much oil or greasy matter is used, as the contact of such matter would be liable to soften it.

The modes of applying asphalte to the pavement of cellars and basements for the purpose of excluding damp will be readily conceived from the above description of its use in ordinary pavements. Where water is liable to rise under the floor, a brick invert, laid in asphalte as a cement, should be adopted, as the simple pavement laid on concrete will not prove effectual. The invert should in such cases be built of masses of bricks previously united with hot mastic, and coated with it on the surfaces which are to form the extrados or outer side of the arch; and a portion of the internal brickwork of the wall, from the springing of the invert to a little above the level at which water is likely to percolate, should be removed, and replaced by bricks laid in asphalte, and having their internal faces coated with it; but as the mastic will not adhere to the damp brickwork of the old wall, any space remaining between the new and old work must be filled with Roman cement. Asphalted bricks for such purposes, and tiles coated with mastic in like way upon one surface, are prepared by heating the bricks (which must be perfectly dry), and laying them in rows upon a flat surface, between gauges of such thickness as to allow a coating of asphalte about a quarter of an inch thick to be spread over the whole in a manner resembling the laying of a pavement, and separating them, and bevelling the edges of the asphalte with a knife, before it is quite set. In some cases an invert may be dispensed with by laying first a bed of concrete covered with tarred paper, then a half-inch layer of fine asphalte, and over that two inches of sand, four inches of concrete (trodden solid, but not rammed, to avoid injuring the lower stratum of asphalte), and above all the ordinary pavement of asphalte, taking good care to line sufficient of the walls to prevent the damp rising through them. Damp may be effectually prevented from rising in walls by forming the whole of one horizontal joint a little above the ground level with mastic in lieu of mortar; and skirtings of asphalte, which are formed by pouring the mastic into iron moulds applied to the wall, and assisting its descent with the spatula, may in some cases be applied with advantage. The wall to which such skirtings are applied should be studded with plasterer's cast nails, driven so as to project about a quarter of an inch, to secure the asphalte. In covering upright surfaces however asphalte is not so applicable as in other cases, since it will not bear exposure to the heat of the sun, and will not adhere well to a damp, dirty, or soft surface. When so applied, the wall must be warmed with braziers, and the asphalte first spread with the spatula to the thickness of a quarter of an inch, and rubbed well to make it adhere. A second layer of equal thickness will complete the work, and fill up defective places caused by the blistering of the first. A more effectual way, which may even be resorted to in situations exposed to the heat of the sun, is to build a new half-brick wall of asphalted bricks, set in mastic, adjoining the wall to be protected, filling the intervening space with mortar or cement. If water percolates through the original wall towards the new wall of asphalted bricks, asphalted tiles, set in Roman cement, should be first applied as a covering to the wall, and to their asphalted surface the new brickwork may be laid solely with mastic. The lining of tanks and reservoirs is an operation so similar to the above as to need no detailed notice.

Roofs, especially if of flat pitch, may be advantageously covered with fine asphalte, laid upon a thin coat of fine concrete, supported by a rough boarding of dry wood. It is well in such cases to cover the concrete with canvass, and to remove the concrete for a width of about three inches wherever the joints of the layers of mastic will come, supplying its place with asphalte; so that if water should percolate at the joint in the upper coating, it will be unable to penetrate further. The lines of junction with walls must also be carefully secured by a kind of flashing, and scooping out the mortar to allow the asphalte to take hold of the brickwork; or, in the case of a stone wall, by cutting a groove to receive the upper edge of the flashing or fillet of mastic. It is recommended that, where roofs are not intended to be walked upon, and especially where they are exposed to the sun, the surface of the asphalte should be strewed with grit, as above described for rough pavements. Respecting the covering of arches, it is sufficient to observe that the asphalte may either be applied immediately to the surface of the brickwork forming the extrados of the arch, with an intervening thin coat of fine concrete; or the spandrils may be filled with concrete so as to form a level surface for the asphalte, even with the crowns of the arches; or, advancing a step further, the concrete may be laid up to the level of the roadway, and the covering of asphalte be used as a pavement, as well as for the exclusion of water. On the Greenwich Railway viaduct, upon which a surface of 430,000 square feet has been covered with mastic, an intermediate plan has been adopted; the asphalte being laid in an undulating surface, with a fall every way.

In whatever way asphalte may be applied, the greatest care is necessary to secure a solid foundation, to ensure the dryness of the concrete or brickwork to which it is applied, to use the mastic as hot as possible, and to make the joints perfect. Wherever any part needs repair it may be softened by laying some hot mastic upon it for a short time, and then cut away with a chisel without injuring the adjacent parts. The old mastic may be remelted, and, the edges of the old work being cut square, the hot material will readily adhere to them, if they are carefully freed from dust and moisture. It only remains to notice that the thickness of asphalte used for pavements varies from half an inch to about an inch and a quarter, the former being sufficient for common floors and court-yards not intended for carriages, and from three-quarters to an inch being the least allowed for carriage pavements; from half an inch to five-eighths is sufficient for roofs and the covering of arches to prevent the filtration of water, and for the lining of tanks and ponds; and about half that thickness is sufficient for covering the ground-line of brickwork, to prevent the rising of damp.

ASPIDIA'RIA (Presl). Several species of the Lepidodendra of Sternberg are thus named. From the coal formation.

ASPI'DIUM, a genus of Ferns, and one under which many species were arranged by older botanists, which are now placed under new genera. For an arrangement of the modern genera see Filices, P. C. S. One of the most remarkable species of this genus is the *Aspidium Baromez*, or Tartarian Lamb, recently referred by Mr. Smith to the genus Cibotium. This plant, from its peculiar colour and form, was at one time really supposed to be a kind of vegetable animal, as the following account from Struys, an old traveller, proves: 'On the western side of the Volga,' he says, 'there is an elevated salt plain of vast extent, but wholly uncultivated and uninhabited. On this plain, which furnishes all the neighbouring countries with salt, grows the Boranez or Bornitsch. This wonderful plant has the shape and appearance of a lamb, with feet, head, and tail distinctly formed. Boranez, in the language of Muscovy, signifies a little lamb, and a similar name is given to this plant. Its skin is covered with very white down as soft as silk. The Tartars and Muscovites esteem it highly, and preserve it with great care in their houses, where I have seen
many such lambs. The sailor who gave me one of t
cious plants, found it in a wood, and I had its skin m
an under-waistcoat. I learned at Astracan, from t
were best acquainted with the subject, that the la
upon a stalk about three feet high; that the part by
is sustained is a kind of navel, and that it turns it
and bends down to the herbage which serves fo
They also said it dries up and pines away when the g
Struys adds many other wonderful things about th
His statement is however substantially correct. Th
of the *A. Baromez* presents a rude resemblance to a
It is covered with a silky down, and when cut into l
inside with a reddish flesh-coloured appearance,
account for the origin of the fables with regard to i
nature. It is not improbable that this fern dries up a
grass does, but of course the one has no depen
other. The Baromez possesses the astringent prop
is common to all ferns; hence it has been used a
Dried specimens have sometimes been brought to thi
but the plant has not yet been brought alive.

Aspidium Filix Mas (now *Lastræa Filix Mas*), th
fern, is a native of Great Britain, and is admitted
British Pharmacopœias on account of its anthel
ties. It has bipinnate fronds, obtuse and serrated p
sori near the central nerve, the lateral nerves fork
abundant throughout Europe, and grows in stony pla
skirts of woods, in open plantations and roadsides. T
used in medicine is the root, or rather the rootstock
part of the plant is collected for medicinal purposes b
the end of May and the middle of September. It
keep well, and should be renewed at least every t
It has often been chemically analyzed, and is found t

Lignin	45
Starch	10
Uncrystallizable sugar .	10
Gum	10
Fixed oil	7
Resin	4
Salts, volatile oil . .	14
	100

The antients used this plant as a vermifuge, b
nearly given up by modern practitioners of
Peschier pointed out the conditions in which it has b
efficacious in expelling tape-worm. The best mode
ministering it is an ætherial tincture: the ether w
dissolve up the resinous oil on which the active prop
the plant depend. The dose of the root according to P
is about one drachm.

A. dilatatum (*Lastræa dilatata*), a British fern, is c
founded with the last for medicinal purposes. It ha
pinnate fronds; oblong, blunt, inciso-pinnatifid lobes;
mucronate segments; a deciduous unfringed indusium
is a common fern, but less generally diffused than the

A. filix-fœmina (Athyrium filix-fœmina), Lady-F
lanceolate pinnate frond; pinnæ linear, acute, regul
nate; pinnules linear-oblong, quite distinct, deeply
pinnatifid; segments with 2 or 3 teeth. This is one o
beautiful of the British ferns. The root is sometime
for that of the male fern. It has 'a short perpendic
stock, black externally, with black root-fibres; and t
bases of the leaf-stalks, which compose the greater
form a very acute angle with its axis, while those o
shield-fern extend outwards at a more open angle.'
tison.)

(Burnett, *Outlines of Botany*; Babington,
British Botany; Christison, *Dispensatory*.)

ASPIDORHY'NCHUS, a genus of fossil Gan
from the lias and oolite of England. (Agassiz.)

ASPIDU'RA. A fossil species of ophiuroid
derms is thus named by Agassiz. From the lia
shire.

ASPLENIO'PTERIS (Sternb.). [Pterophy
C. S.]

ASPLE'NIUM, a genus of plants belonging
tural order of Ferns. [Filices, P. C. S.] It has
straight sori, with an indusium opening towards t
nerve or midrib. The species of this genus are kno
name of Spleenworts; several of them are commo
Britain.

A. lanceolatum of Hudson has lanceolate doubl
fronds; the pinnules ovate and deeply and sharply t
lobed; the sori short, nearly marginal. It is a

Vales, on rocks and walls, but its distribution is t is also a native of France, but its European w.

on-*Nigrum*, Black Spleenwort, has triangular nds, twice or thrice pinnate, the pinnæ and gular, sharply toothed; sori elongated, central. native of Europe, and is abundantly distributed e United Kingdom, where it occurs on rocks, d hedge-rows. This is one of the ferns formerly medicine, and is stated by Ray to be efficacious ma, pleuritis, jaundice, stone, gravel, and other has not however any reputation amongst modern f medicine.

uraria, Wall Rue, has bipinnate fronds, the bid wedge-shaped, notched or toothed at the jagged. This fern is very common on alls, in Great Britain and throughout Europe, ative of North America. It was at one time dy in coughs and asthmas, obstructions of the taneous diseases; but has now fallen into dis-

anes, Common Spleenwort, has pinnate linear ish ovate, crenate, stalked pinnæ; the nerves he sori. It is very common throughout Great ks, walls, churches, ruins, bridges, and hedge- native also of Europe, Africa, and the United ern has been also used in medicine, and for the as the previous species, but it has fallen now suse. The other British species of Asplenium *ifolium, A. septentrionale, A. marinum, A.*

other ferns may be easily cultivated, by placing tions resembling their natural habitats. They atmosphere, plenty of space, and natural shade, pply of water. They may be planted on de- holes of rocks and brick, with almost any soil. st elegant modes of cultivating them is by means s, under which they will thrive in any sandy or ses well adapted for growing ferns are made on constructed according to directions laid down by ho has the great merit of having first suggested rowing plants.

Manual; Newman, *History of British Ferns*; *of Plants in Glazed Cases*.)

is in Scotland a punishable offence, usually the public prosecutors attached to the sheriffs' police courts established by statute, and to the ce courts. It is seldom brought before the nal court, unless it be of a highly criminal it is then generally charged as assault with ggravation, as 'assault aggravated by being to blood,' or as 'being to the danger of life,' or mitted against a magistrate,' or 'by being per- a lethal weapon,' an expression applicable to a , hammer, or any instrument more formidable ary walking-stick. Criminal prosecutions for instance of private parties, are almost unknown. red may pursue for civil damages before a jury; utions are not frequent. There is no division, into 'assault,' and 'assault and battery.' Many regulations, as to assaults by manufacturers, &c., land. The later statute law on this subject, assed to alter laws peculiar to England, does apply to Scotland. The 6 Geo. IV. c. 129, tive to assaults connected with combination, part of the kingdom. The respective pun- various kinds of assault have thus, in Scotland, measure fixed by the practice of the several .

RG ANTON FRIEDRICH, an eminent r, was born in 1778 at Gotha, at the gymna- place he was educated. In 1798 he entered of Jena, where he devoted himself at first to theology; but he soon abandoned this pur- himself up to philological and philosophical 02 he began his career as an academical lec- iversity of Jena; and in 1805 he was appointed tient literature in the University of Landshut, ained until the transfer of that institution to 12. He spent the remainder of his life at he died on the 30th of December, 1841.

of the best and most industrious of modern a very excellent teacher. His merits were recognised and rewarded by various distinctions which the Bavarian government conferred upon him. He occupied himself not only with philology, in the strict sense of the word, but also with several departments of philosophy and its history; and these pursuits led him, during the latter period of his life, to devote himself almost exclusively to the study of Plato, for the understanding of whose works he has done more than any other scholar. His numerous works may be divided into two classes, philosophical and philological. Among the former we must notice especially his 'Handbuch der Aesthetik,' Landshut, 1807, 8vo.; 'Grundlinien der Philologie,' Landshut, 1808, 8vo., an excellent introduction to the study of antiquity; 'Grundlinien der Grammatik, Hermeneutik und Kritik,' Landshut, 1808, 8vo.; 'Grundlinien der Philosophie,' 2nd edit., Landshut, 1825, 8vo., a very good introduction to the study of philosophy; 'Hauptmomente der Geschichte der Philosophie,' München, 1829, 8vo.; 'Platon's Leben und Schriften,' Leipzig, 1816, 8vo., one of the best works on Plato that have been written in modern times, and forming a very useful introduction to the study of that philosopher. Among his philological works we may mention 'Observationes in Propertii Carmina,' a youthful production which he published before entering the university in 1798. In 1809 he began editing a number of separate dialogues of Plato, such as the 'Phaedrus,' 'Symposium,' 'Alcibiades,' 'Leges,' and others, which were well received; and this led him to the publication of a complete edition of Plato's works (Leipzig, 1819-32), in 11 vols. 8vo., with a Latin translation, and a commentary which occupies the last two volumes. He next published, as a sort of supplement to this edition, a 'Lexicon Platonicum,' Leipzig, 1834-39, 3 vols. 8vo., which is one of the best special dictionaries that we have. In a critical point of view, his edition of Plato is greatly surpassed by some of the more recent editions of that philosopher.

(*Biographical Dictionary* of the Society for the Diffusion of Useful Knowledge; Brockhaus, *Conversat.-Lexicon*, 9th edition.)

ASTERACA'NTHUS, a genus of fossil Placoid fishes, including five British species, from the oolitic and lias formations. (Agassiz.)

ASTERA'CEÆ. [CORYMBIFERA, P. C. S.]

ASTEROPHYLLI'TES (Brongniart), a fossil genus of plants, containing many species, from the coal formations of Europe and America.

ASTEROPTY'CHIUS, a genus of fossil Placoid fishes, from the mountain limestone of Ireland. (Agassiz.)

ASTLEY, JOHN, a portrait-painter, born at Wem, in Shropshire, in the early part of the eighteenth century, more distinguished for his good fortune than for his works, though these, according to Walpole and Edwards, were not without merit, especially those of his earlier years. He was the fellow-pupil of Reynolds with Hudson, and was at Rome also at the same time with Sir Joshua. He was very poor when studying in Rome; and Northcote, in his Life of Reynolds, tells a ludicrous anecdote about his poverty. On one occasion, upon a summer's evening ramble near Rome with other English artists, his companions took off their coats and advised Astley to do the same, to which he objected; and his persisting to keep his coat on appearing unaccountable to them, caused them to make some jokes at his expense, which at last forced him to follow their example, when the mystery was out,—the back of his waistcoat was made out of one of his own sketches, and the poor painter, with a waterfall on his back, made a ludicrous figure, which afforded his companions a hearty laugh.

After his return to England he spent a few months in London, and then tried his fortunes in Dublin, where he practised with such success that in three years he saved 3000*l.* He considered this capital sufficient to enable him to venture his fortunes in London; and 'as he was painting his way back to London,' says the writer in Adams' Biographical History, 'in his own post-chaise, with an outrider, he loitered with a little pardonable vanity in his native neighbourhood, and visited Knutsford Assembly with another gentleman. Lady Daniel, a widow then present, was at once so won by his appearance, that she contrived to sit to him for her portrait, and then made him the offer of her hand.' This lady was the widow of Sir William Daniel, and was possessed of a very large fortune, the whole of which she bequeathed to Astley, besides the reversion, at her daughter's death, of the estate of Duckenfield Lodge, Cheshire, worth 5000*l.* a year. Lady Daniel died not long after her marriage, and her daughter did not survive her many years. Astley obtained possession of the property, and gave himself up to a life of pleasure. He purchased the house in Pall Mall which had belonged to the Duke of Schomberg, of which Pennant, in his 'London,' says, 'It was in my time possessed by Astley the painter, who divided it into three, and most whimsically fitted up the centre for his own use.' He fitted up also a villa at Barnes, in Surrey, according to a peculiar fancy; and he made many improvements in Duckenfield Lodge. After a life of pleasure, as he was growing old, he married again, a young lady, by whom he left two daughters and a son. He died at Duckenfield Lodge in November, 1787. Before his death his character changed; he regretted the dissipated life he had led; but, as his biographer has said, if he owed his fortune to his form, he owed also his follies to his fortune.

(Walpole, *Letters*, vol. ii.; Edwards, *Anecdotes of Painting*, &c.)

ASTROCRINITES (Austin), a fossil genus of Crinoidea, from the mountain limestone of Yorkshire.

ASTY'LAR, one of the numerous compound architectural terms from the Greek *stylos* (στῦλος), column; which, having the Greek privative *a* prefixed to it, signifies without columns. It does not indeed occur in the usual architectural glossaries; but it ought to be adopted, being exceedingly convenient and expressive, inasmuch as it explains at once that the building described by it is without any order of columns or pilasters, however ornate it may be in all other respects. Thus, we speak of Astylar Italian in contradistinction from the columnar class of buildings in that style, or such as are decorated with the orders. Astylar composition is not only susceptible of a very high degree of embellishment, but of a species of grandeur not attainable (that is, on the same scale) in the Palladian style, or that where an order is raised upon a basement, or even more than a single order is employed for a façade, because in the former the cornice is proportioned to the entire elevation; sometimes of greatly increased proportions, and then distinguished by the name of *cornicione*. In this country we had no examples of such *astylar* class of design, until it was introduced by Mr. Barry, in the Travellers' and Reform Clubhouses; since which it has been employed by other architects.

ATHENS. In this supplement to the article ATHENS, P. C. vol. iii. p. 10, &c., it is intended to mention those corrections which have been made in the topography of Athens through the researches and excavations which have been carried on within the last ten years, and which are the more necessary as Colonel Leake, in the second edition of his Topography of Athens, has not incorporated all that could have been expected after such important discoveries by which many of the most conspicuous errors have been removed. In the second edition of Leake's work, the hill to the north-east of the city is still called Anchesmus, whereas it has been incontrovertibly shown that this hill is the Lycabettus (Forchhammer, 'Zur Topographie Athens, ein Brief aus Athen und ein Brief nach Athen,' Götting. 1833.) The site of the hill Anchesmus is still a disputed point. The hill in the west, which according to Leake is the Lycabettus, is proved by an inscription which was found there (Böckh, *Corpus Inscript. Graec.* i. No. 543), to have borne the name of the Hill of the Nymphs. In consequence of this error the antient walls of Athens are extended too far to the north-east, while in the west a large portion which was inclosed within the walls is described as having been without them. The antient walls (that is, those built by Themistocles) in the south and west ran, according to Leake, across the Pnyx and the hill of the Museum, and did not extend beyond the Ilissus in the south. He was led to this opinion by some remnants of a wall which are still visible on the Pnyx and the Museum, but Forchhammer supposes that they are not remains of an ancient Greek ructure, but that they belong to a wall erected in the reign of the Emperor Valerian. The antient walls, according to Forchhammer, comprised the Hill of the Nymphs, the whole of the Pnyx and Museum, and the well Callirrhoe, and to the south they embraced a considerable portion of the left bank of the Ilissus, so that the Enneacrunos, the temples of Demeter, Triptolemus, and Artemis Eucleia, which are mentioned by Pausanias, and farther on the Panathenaic Stadium, were inclosed within the walls, which again ran across the Ilissus in the neighbourhood of the Lyceum. The arguments by which Forchhammer has established this view are very cogent.

Respecting the gates of Athens a great diversity of opinions still prevails, and must prevail so long as critics are not agreed upon the gate with which Pausanias in his description begins his account. At present there are no less than four gates
which claim this honour. The most probable
he entered Athens by the Piraean gate, betwe
and Pnyx, an opinion which was first expressed
has been adopted by Müller, Forchhammer, and

One of the fundamental errors in former
Athens, was that ever since the time of M
believed that at two different times Athens had
places (ἀγοραί), an old and a new one; the
west and the other to the north of the Acro
thinks that the Agora was transferred to the north
Augustus, or in the last century before the Chris
the passages quoted in support of this supposition
proving the case; and what was formerly calle
the New Agora, is proved both by its style and
not to have been a gate, but part of a building
the donations of C. Julius Caesar and Augustus
of Athena Archegetis. That whole district in wh
Agora is supposed to have been, was in the tim
dides not occupied by houses, but consisted
(Thucyd. ii. 17; Xenoph. *De Vectigal.* 2. 6.)

The form and basins of the port of Piraeus
been the subjects of much discussion, and the
Ulrichs endeavoured to establish an opinion
opposed to that of Leake, as well as to the later
but it is as yet impossible to say which of the
views is the correct one. (Curtius, *De Portubus*
Halle, 1842, 8vo.; Ulrichs, Οἱ λιμένες καὶ τὰ μα
'Αθηνῶν, Athens, 1843.)

We cannot here enter upon an explanation
points in which the topography of Athens has b
and corrected by late investigations; the stude
to the works quoted at the end of this article.
only a brief account of the most important di
have been made at Athens. The Acropolis is
in which excavations have been made on a la
with something like systematic order. Operatio
menced there in 1833 by a private society
The year after, when Athens was made the
kingdom of Greece, the government took the
own hands. The excavations were conducted
brated German architect L. von Klenze, and
Professor Ross, assisted by the architects S
Cleanthes, whose place was soon after supplied
Ross was succeeded in 1836 by Pittakis. The
excavations down to 1843 are briefly but well
Curtius, *Die Akropolis von Athen*, Berlin, 1844,

The operations in the Propylaea began in 18
thing that was done was to remove the modern
which blocked up the entrance to the Acropolis.
upper battery which extended from the pedestal
Agrippa in the north to the corner of the Cimoti
south, was next taken down. The discoveries th
most unexpected. The fragments of the ruined
tory unwinged (Nike Apteros) were found alm
and very little injured; many fragments of the P
sisting of sculpture and pieces of architecture
and some highly important inscriptions, were br
A considerable part of the marble flight of steps
Propylaea was laid open at a somewhat later tim

In the winter of 1836-37 operations were com
Propylaea itself; the central part and the north
cleared from the modern constructions built in t
the battlements which had been erected upon t
middle ages. In the central part, the six Io
the vestibule are still standing, though only a
of their original height, except one which is s
rest. The parts of these columns, however, w
down, were found among the ruins, but the cap
damaged. The northern wing is in perfect pres
the cornice; and the tower of the southern wing
ing, but no trace has been found of the paintings w
saw in the Propylaea. The most remarkable di
of the temple of Victory mentioned before. A
ments were in a state of almost perfect preservat
have been destroyed by force; and as Spon an
it still standing, it was probably taken down
in 1684, for the purpose of using the masonry
the great battery. Out of all that thus remaine
was made to restore this beautiful edifice, and
restoration was nearly completed. The work
by Ross, Schaubert, and Hansen, but after the
Ross in 1836 the progress was somewhat delaye
however, the restoration is complete, and the

en in its full beauty; it serves as a temporary ich some of the newly discovered relics of an- osited.

rnment had resolved upon clearing the whole Acropolis from the rubbist. and modern build- ns were also made in and around the Parthenon. nd most valuable fragments of the metopes, the he statues in the pediments, which are deposited s of Athens, but have not yet been examined. osque which had been built within the cella of t was cleared away, and the place where the had stood was found. The area on the eastern leared, and the columns of the north side, which wn, were erected again. In 1837 workmen employed in removing the rubbish from within he Erechtheum, and all that could be restored has been restored, especially along the where the wall of the cella is now raised to half ght. The flight of stairs in the eastern front been laid open. In the interior however the not seem to have been carried out to their full g at least has been made known, except a few

to the discovery of sculptured and architectural he Acropolis, we must notice that in 1839 the statue of Athena Hygiea (Paus. i. 23. 5) was the Propylaea, and in the south of the same nts of the enclosure (peribolos) of the temple n Artemis were laid open. (Pausanias, i. 23. 7.) east the pedestal of the Trojan horse (Paus. i. that of Epicharinus (Paus. i. 23. 11) were s these things, which are mentioned by Pau- er of substructions and fragments of works of discovered, which are yet unexplained. The along the southern side of the Parthenon is also : its breadth varies between six and eight es.

d account of all the topographical discoveries, ferred to the second edition of Leake's *Topo- ns*, London, 1841; his paper *On some disputed he Topography of Athens*, in the Transact. of for 1839, p. 183, &c.; and his paper *On the a*; Forchhammer, *Topographie von Athen*, ich contains a detailed Plan of Antient Athens, one of the Modern city, showing the relation o; Ross, Schaubert, and Hansen, *Der Tempel eros*, Berlin, 1839; Welcker, in the *Rhein-* 843; Quast, *Das Erechtheion zu Athen*, &c., Müller, *De Foro Athenarum*, Götting. 1839. d critical survey of all that has been done in or the topography and antiquities of Athens, is estermann, in the *Neue Jahrbücher für Phi- dagogik*, vol. xli. p. 230-248.

to the modern city, dating from the commence- Otho's government, it can be considered at y in a state of formation. Hardly anything lescription is as yet to be collected respecting utionary measures which ought to have been first instance, appear to have been neglected, it of by some as matter for very great regret that llowed to be erected too precipitately, with immediate convenience, and just as suited indi- t any or with scarcely any regard to the future rity, and beauty of the city. Sites that ought reserved by the government, or else laid out me well-arranged general plan, were left to be t as people pleased, whereby houses of a very ave got possession of some of the best—or what been rendered the best—parts of the town. hey are not of very durable or costly construc- probably in a few years begin to give place to e meanwhile some of the more recently erected l other buildings are spoken of as being of a kind—such as would be an ornament to any pe, but even if deservedly bestowed, such com- y far too general and vague to afford any idea r particular merits.

me with regard to what public edifices have erected. We can therefore only enumerate er, only give the names of such as we have seen he principal ones, *i. e.* the Mint, the Military Barracks, the Royal Stables, and the Royal as at first proposed that the Palace should be erected on the Acropolis, at its east end, and along the south side there, nearly as far as the Parthenon, and designs for the purpose were made by Schinkel, who afterwards published them in his 'Höhere Baukunst;' but the idea was abandoned, probably on account of the difficulty of forming a sufficiently commodious ascent for carriages. Accordingly, other designs for a different situation were prepared by the great Munich architect, Von Klenze, but they also were laid aside; and a third set were made by Gärtner, another very eminent Munich architect. Gärtner's designs were finally adopted, and the first stone of the new structure was laid in March, 1836, on quite a different site from either of those at first proposed, namely, on the east of the city, and at that extremity of the new Hermes Street. This, which may be considered the main street, extends through the city from east to west, and two other principal new streets, Æolus and Athene streets, run into it on its north side. The new street called Stadion Street is to the north-east of the old town. By a letter from Athens, dated November 14, 1844 (published in the 'Athenæum'), it appears that the government intends to found a national Archaeological Museum, to be erected upon the Acropolis, and in which are to be placed the various antiques now deposited in the temple of Theseus and other places, and whatever others may either happen to be discovered or to be purchased by the state; also models of the antient buildings still remaining in Greece.

ATMOMETER, called also Atmidometer or Atmedometer (from ἀτμός, 'vapour,' and μέτρον, 'a measure'), an instrument employed to measure the quantity of exhalation from a humid surface in a given time. Allusion is made in the 'Edinburgh Encyclopædia' to an instrument of this kind described by Professor Richman (in the *Nov. Comment. Petropol.*, vol. ii. p. 121), with the nature of which we are unacquainted; but the instrument to which the name is usually applied is one invented by Professor Leslie, which consists of a very thin ball of porous earthenware, two or three inches in diameter, to which is cemented a long tube of glass, marked by a diamond with divisions, each of which is capable of containing as much liquid as would, if spread over the outer surface of the ball, cover it with a film equal in thickness to the $\frac{1}{1000}$th part of an inch. The open end of the tube is fitted with a brass cap and a leather collar; and when in use the instrument is filled with distilled or boiled water, and suspended vertically with the ball downwards, the end of the tube being perfectly closed with the cap and collar. The water then percolates through the porous ball precisely in proportion to the evaporation from its outer surface, of which its waste in the tube forms an accurate indication. The vacuous space above the water in the tube becomes, during the operation, gradually filled with air which enters through the porous ball. When the tube becomes empty, the cap is removed to refill it. This instrument is not only useful in meteorological observations, but is also capable of being applied with advantage in chemical operations, and in the application of science to agriculture.

ATMOSPHERIC RAILWAY. In a brief sketch of the history of this invention, in a lecture delivered by Mr. Vignoles (then professor of civil engineering at University College, London), to the Royal Cornwall Polytechnic Society, in October, 1842, that gentleman observed that the idea of producing motion by atmospheric pressure was conceived by Papin, the well-known French engineer, nearly two centuries since; and that, after slumbering for more than a century, the subject had been successively taken up by Messrs. Lewis, Medhurst, Vallance, and Pinkus, and lastly by Mr. Clegg, by whom, in connection with the late Mr. Jacob Samuda, the practicability of this mode of locomotion has been fully proved.* Of the connection of the name of Lewis with this invention the writer has no other intimation; but the publications of the late Mr. Medhurst, who was a practical mechanician or engineer, carrying on business in London, and known as the inventor of an ingenious printing-press, show that he not only cherished the idea of locomotion by atmospheric pressure for many years, but also devised, among other plans for its accomplishment, one which, excepting in practical detail, greatly resembles the present atmospheric railway. Medhurst published a short account of his scheme in 1810, under the title of 'A New Method of Conveying Letters and Goods by Air,' and in 1812 he issued another pamphlet of 'Calculations and Remarks,' to prove the practicability and advantages of such a mode of conveyance; but, as he observes in a more recent work, 'these publications met with that indifference and contempt which usually attends all attempts to deviate so widely from established customs.' In the pamphlet from which this remark is quoted, which was published in 1827, entitled 'A New System of Inland Conveyance for Goods and Passengers,' is a fuller account of the various modes in which it was proposed to accomplish the desired object, the principal of which were, first, the construction of an air-tight tunnel of sufficient magnitude to admit the passage of carriages within it, running upon iron rails, and propelled by forcing in air behind them by pumping machinery, the carriages being made so nearly to fit the tunnel that the air thus forced in could not pass them, but must act upon them as upon a piston; secondly, the propulsion of such carriages in certain cases, in the reverse direction, by exhausting the tunnel in front of them, instead of forcing in air behind them; thirdly, the use of a smaller tunnel, containing what may be termed a piston-carriage for the conveyance of goods within the tube or tunnel, and having a kind of valve which would open during the passage of the piston-carriage so as to allow a rod from it to pass out of the tunnel, and afford the means of propelling a second carriage, for passengers, running upon a railway either above or alongside of the tunnel, in the open air; and, fourthly, the construction of a railway or tram-road, in the centre of which should be laid a still smaller air-tight tube, containing a travelling piston which should be connected, as in the last-named contrivance, with an exterior carriage. One of the modes in which it was proposed to connect the carriage outside the tube or tunnel with the piston within it, was by an air-tight water-valve, which however would only have been applicable on a perfect level, and with a very low amount of atmospheric pressure; and another, applicable to all levels, was formed by thin elastic sheets of iron or copper, shutting down upon a soft substance, so as to form an air-tight joint, but capable of being readily lifted up to allow the passage of the connecting-bar, by the action of a wheel connected with the piston. In all cases Medhurst appears to have contemplated moving the piston by forcing air into the tube behind it, and thereby forming a plenum, in preference to forming a vacuum by exhausting the tube in advance of it; and he seems also to have formed a very inadequate idea of the degree of atmospheric pressure necessary to produce rapid motion, imagining that in a tunnel of thirty feet sectional area carriages might be propelled at the rate of sixty miles per hour without the condensation of the air becoming uncomfortable to the passengers, who, according to his original plan, would not have been shielded from its effects.

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* A condensed report of this lecture, originally published in the 'Cornwall Gazette,' appeared in the 'Railway Times' of Oct. 29, 1842.

Before the publication of the last-mentioned pamphlet of Medhurst, but many years after the original promulgation of his scheme, Mr. Vallance, of Brighton, drew public attention to a similar project, which, being brought forward at a season of extraordinary speculation, excited much interest, as well as no little ridicule. Vallance's scheme, which was fully explained in a pamphlet published by him in 1825, entitled 'Considerations on the expedience of sinking capital in Railways,' was, like Medhurst's original design, for conveying passengers along a railway laid within an air-tight tunnel, which he proposed to construct either of cast-iron or of vitrified clay, resembling common brickwork, but less permeable to air; but, knowing that experiments had proved a very great loss of power to result from the attempt to impel air through a long pipe, he proposed to set the piston-carriage in motion solely by exhausting the tunnel in advance of it, and suffering the full pressure of the atmosphere to act upon its rear. This plan, which was patented in 1823, was brought into experimental operation at Brighton upon a sufficiently large scale to prove the possibility of so singular a mode of transport, but, had there been no other difficulties, the objections of the travelling public to transmission in a dark close tunnel would have proved sufficient to prevent its general adoption.

About the year 1835 the subject was revived in consequence of a patent being taken out by Mr. Henry Pinkus, an American gentleman residing in England, for an apparatus which he called the Pneumatic Railway, and which, as originally proposed, was to consist of a cast-iron tube from 36 to 40 inches diameter, internally, of an average thickness of three-quarters of an inch, and having a longitudinal slit or opening from one to two inches wide along what was, when laid in its proper position upon the railway, intended to be its upper side. Two ribs or cheeks, cast with the tube, along the sides of this opening, formed a channel or trough from *four to five* inches wide and deep, which in order completely
to close in the tube or tunnel, and prevent the ingre
was filled with a valvular cord of some soft and yield
stance strengthened by being formed upon a peculiar
structed iron chain, so arranged that when the valve
in its place in the trough the soft matter should
exclude the passage of air, while the iron portion of
lying upon and covering the edges of the vertica
should at once protect the valvular cord from injury
vent its being forced into the tube by any external
Within this tube was placed a piston-carriage, de
the dynamic traveller, which was impelled forward
pressure of the atmosphere in its rear whenever, by th
of pumping machinery connected with the tube,
vacuum was formed in front of it. In the rear of th
the dynamic traveller carried an apparatus for
valvular cord out of its seat, so as to allow of the fre
along the slit or opening of a connecting bar by
dynamic traveller was placed in communication wit
ternal carriage, called the governor, to which the
be drawn were attached; and immediately after th
of this connecting-rod the valve was restored to
sides being fresh lubricated by an apparatus
governor, and the whole being pressed firmly
wheel or roller. In this form of the apparatus
and the carriage attached to it ran upon rails
cast upon the external sides of the pneumatic tube;
subsequent modification of the invention the tube wa
reduced in size, and laid down in the middle of th
an ordinary railway, and a kind of pneumatic
engine was substituted for the governor, the p
engine working after the manner of a common
engine, excepting that, in lieu of steam, a motive
to be obtained from the atmosphere, by the aid of th
tube, with which the engine was placed in com
The former plan was publicly exhibited in a small
an experimental railway was partially laid down
Kensington Canal for the trial of the latter upon
scale, under the auspices of an association formed
the pneumatic railway into use; but, from what
not aware, the matter fell through, and no more
Pinkus's plan until the somewhat similar appara
Clegg and Samuda was brought into operation
some feeble attempts have been made to stop
ings as being infringements of Pinkus's patent

The failure which had attended so many attempt
pneumatic transport to a practical trial led to a
feeling of distrust, when, in 1840, Messrs. Clegg
brought forward their 'Atmospheric Railway;'
some satisfactory experiments upon a more li
those gentlemen arranged with the proprietors of
unfinished Thames Junction or West London Rail
the temporary use of a portion of their line near W
Scrubbs, upon which they laid down about half a
railway, with a rising gradient partly of 1 in 120,
of 1 in 115, and with the disadvantage of a very
track formed of old contractor's rails (which, it is
observe, had formed part of the original rails of the L
and Manchester Railway); yet, notwithstanding
other unfavourable circumstances arising from the im
of the machinery, and the shortness of the line, wh
not admit of the attainment of a maximum speed, th
of the first trials, on the 11th of June, 1840, showed
mum speed of 30 miles per hour with a load of 5
in one carriage, and of $22\frac{1}{2}$ miles per hour with
11 tons 10 cwt. in two carriages. This experime
which had an atmospheric tube of only nine inches
was publicly exhibited in action at intervals, for many
during which it was visited by many eminent eng
this and other countries, and its success was
by the directors of the Dublin and Kingstown Railw
so decisive, that they determined to adopt the atm
mode of working upon a projected extension of their
Kingstown to Dalkey, the gradients and curves
rendered it unsuitable for working by locomotive
This line, which was so far completed as to be
working in August, 1843, is at present (December,
only line of atmospheric railway in existence,
mentioned line having been removed to allow the co
of the West London Railway, which is worked by
tives; but though no other lines are yet made, the
and Croydon Railway Company have recently obtain
liamentary sanction to a plan for laying down a line of
pheric Railway alongside of their present road, from

d making an extension of the same from
om, by which arrangement there will be a
heric line of about 18 miles, half of which
with and close to a railway worked by
es, thus affording the most satisfactory data
between the two modes of transport. A
a Epsom to Portsmouth,* and several other
s of considerable extent, are also proposed
in this manner.

ortant point in which the atmospheric rail-
legg and Samuda differs from previous con-
like character is the construction of the valve,
n the speed of the piston and train is increased
s per hour (a speed frequently attained in ex-
the Dalkey line), performs its office with sur-
. The subjoined diagrams, without pretending
ails, will show the nature of this contrivance:
ng a cross-section of the atmospheric tube with
and *Fig.* 2 with the valve open for the passage
g-bar between the piston and the external
tube, which is formed of cast-iron, in con-
and flanged together, is laid in the middle of
, and firmly secured to sleepers imbedded
diameter may be different on different lines,
e of piston) on different parts of the same
mmodate the power to the resistance to be
n the Dalkey line, which rises 71 feet in a
le and three-quarters, a tube of about 15
Along the upper side of the tube is the con-
ening, at *a*, *Fig.* 1, and a little on either
vertical ribs or cheeks *b* and *c*, cast with the

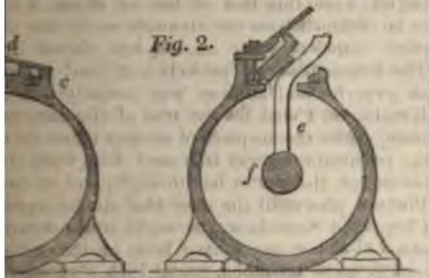

Fig. 2.

etween which forms a trough wherein the
ure from injury. The valve itself consists
ong leather, firmly enclosed between two
e undermost of which exactly fits the slit in
its lower surface concave, so that when it is
Fig. 1, the internal circumference of the
and unbroken, while the uppermost is flat,
the slit, so that it prevents the valve being
ube by the superincumbent pressure of the
e leather is, on the side marked *b*, consider-
the upper plate, and its projecting edge is
at floor of the valve-trough, at the base of
is to form a continuous hinge. The more
ent the ingress of air, the opposite or open-
alve is, when closed as in *Fig.* 1, hermeti-
a composition of wax and tallow, which fills
or space left between it and the cheek *c*, and
dark mark in the cut. To protect the valve
the trough is closed in with a sheet-iron
n lengths of about five feet, with lap-joints,
er to the top of the cheek *b*, and shutting
n the top of the cheek *c*. The interior of
letely lined with a soft composition, which
irregularities, and renders the passage per-
d even; and the piston is surrounded by
such a way as to be perfectly air-tight, and
very little friction. It is attached to the
which is seen in section at *f* (*Fig.* 2), and
lers so fixed as to lift up and open the valve
r the piston has passed, thus bringing it into
cated in *Fig.* 2, which allows room for the
nnecting-bar *e*, by which the piston is united
arriage of the train; the iron cover *d* being
and held open by a coulter and a series of

wheels or friction-rollers attached to the carriage. After the connecting-bar has passed, a roller attached to the carriage presses the valve down into its seat, while a heater gliding along the mass of composition at its opening edge melts it, and thereby seals the joint afresh. The cover *d* is then allowed to fall into its place, and all is ready for the passage of another train so soon as the piston shall have quitted the pipe so as to allow of its being exhausted afresh. The end of the tube behind the train is left open, to admit the air by which the piston is to be impelled; but the end in advance of the train is closed, and the air is pumped out from the tube by a branch pipe near it, leading to the air-pumps, which may be worked either by a steam-engine or by any other prime mover of sufficient power. It is proposed, in an extended line of railway, to place engines at intervals of two or three miles, and to break or interrupt the continuity of the atmospheric tube at the principal stations, so as to allow of the use of switches, turn-tables, and the other ordinary arrangements of a railway station; but it is needless here to enter upon an explanation of the various means by which these objects are accomplished. It is sufficient to observe that the train is pushed forward by manual labour until the piston has entered the tube, which it may do, by the aid of an ingeniously contrived valve, without impairing the partial vacuum which may have been previously produced in it; it then advances with a speed proportionate to the rate at which air is abstracted from the tube by the air-pumps until it reaches the opposite end of the tube, where, without the aid of an attendant, the valve which has closed the tube flies open, and the piston and train proceed by momentum until they are stopped by breaks if requisite, or, if it be desired to pursue the journey without stopping, until the piston enters another length of pipe. As soon as it has passed out of the first length, the end-valves are again closed, and the engines immediately commence the rarefaction of the tube in readiness for another train. Both in the experimental line at Wormwood Scrubbs and the atmospheric railway at Dalkey the inclination of the road is sufficient to produce rapid motion in one direction by gravity alone, so that the atmospheric pressure is only required in ascending, while in descending the piston is moved aside in such a way as to pass clear of the tube but this mode of propulsion is equally applicable to working in both directions, either by means of two separate tracks, each having its own atmospheric tube, or by a single track and tube, along which the piston is impelled alternately in either direction.

While the opinions of leading engineers continue at variance as to the merits of this mode of working a railway, it may be well to say very little of its proposed advantages. Some of these it claims in common with every other mode of working by stationary instead of locomotive engines [RAILWAY, P. C., vol. xix., p. 260], of which the principal are the facilities which it affords for ascending steep gradients, and consequently for constructing railways at less cost than where heavy cuttings and embankments are necessary in order to procure easy slopes for the locomotive; the saving in the wear and tear, and consequently in the necessary strength and cost of the railway itself, in consequence of not having to convey the moving power with the train; and the security against collision, owing to the impossibility of moving two trains on the same stage or engine-length of railway at the same time. In like manner also some of the objections raised to this apply to every other mode of using stationary engines: such are the necessity of providing and constantly maintaining a power sufficient to conduct the largest amount of traffic which can ever be conveyed, which would render it as costly, as regards some large items of expense, to maintain a railway for the passage of four or five trains per diem as one upon which trains are constantly succeeding each other; and the liability of derangement to the whole system in consequence of the failure of a single point in it. These are the principal grounds for objection to what has been termed the *inflexibility* of the system, or, in other words, the comparative want of power to modify the mode of working according to the fluctuations of a variable traffic or the exigencies arising from accident. In drawing a comparison between atmospheric and rope traction there is less difficulty, for while in many points the merits and demerits of the two are identical, the vacuum in the one supplying the place of the rope in the other, it cannot be questioned that the train of an atmospheric railway is by far the most secure from accident, especially upon curves, it being as it were tied down to the track by the piston travelling within the tube; and also that,

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was written, the line alluded to has been rejected by the
hat it is now doubtful whether it will be brought before
ught before Parliament, whether an act will be obtained
the Board of Trade giving the preference to a rival line,
ve engines, branching out of the South-Western Railway.

the difficulty of producing a valve which shall open with sufficient facility and close with sufficient exactness being once overcome, which it appears to be most perfectly, the friction and waste of power must be very much less in the atmospheric system than where a heavy rope and a long series of pulleys have to be put and kept in rapid motion; to say nothing of the chances of accident by the breaking of the rope, to which there is no equal risk as a parallel objection to the atmospheric system. Its safety is indeed one of the great advantages claimed for this mode of working a railway, as the worst which could happen in consequence of the failure of the apparatus would be the stopping of the train. In case it should be necessary to stop in the middle of the tube, so as to avoid collision with an obstacle on the road, the breaks will generally be found sufficient for the purpose, as there is not the immense momentum of the heavy locomotive to overcome; but it is proposed, if needful, to introduce a safety valve in the piston, or an arrangement for admitting air in front of it, in case of emergency. It is proposed generally to lay out atmospheric railways so nearly on the natural surface of the ground as to take advantage of many slopes of sufficient steepness for working by gravity alone; but while this has been much insisted upon by some advocates of the system as an advantage, it appears to be too little remembered that the advantage gained in one direction must inevitably produce a corresponding disadvantage in traversing the line in the opposite direction. Even some of those who still question the economical application of the atmospheric in lieu of the locomotive system, consider it well adapted for use upon such inclined planes as have hitherto been worked by ropes or by assistant engines.

(Further information upon the early plans of atmospheric propulsion may be obtained from the pamphlets alluded to in this article, and, so far as those of Pinkus are concerned, from the *Railway Magazine*, First Series, 1835-6, and Second Series, vol. i. 1836, and Hebert's *Engineer's and Mechanic's Encyclopædia*, vol. i. pp. 35-40. Clegg's atmospheric railway has given rise to several pamphlets, chiefly of a controversial character, and, especially in connection with the Croydon and Epsom Railway Bill in the session of 1844, to much investigation by parliamentary committees; but the most complete body of information on the subject, with accurate records of the principal experiments at Wormwood Scrubbs and at Dalkey, will be found in the columns of the *Railway Times*, from 1840 to the present time.)

A'TRIPLEX, a genus of plants belonging to the natural order Chenopodiaceæ and the tribe Atripliceæ. It has monœcious, rarely perfect flowers, the perigone of two more or less connected parts, two stigmas, a free membranous pericarp, a crustaceous testa; the seed is vertical, attached by a lateral hilum, either near the base or by means of an elongated funiculus in the middle of the side; the radicle basal; the stamens five, continuous. Most of the species of this genus are insignificant weeds, and are sometimes troublesome pests in corn-fields. Babington, in his 'Manual of British Botany,' enumerates ten species as inhabitants of Great Britain. The most common forms of the genus on cultivated lands are *A. angustifolia*, *A. erecta*, *A. patula*. Mr. Babington has described recently a new species, which is also found in cultivated and waste places, not uncommonly in Great Britain. This is *A. deltoidea* (Bab.): it has an erect stem with ascending branches; opposite leaves, all hastate-triangular, with two descending lobes unequally dentate or sinuate-dentate; the perigone of the fruit ovate-triangular, dentate, tunicated on the back, rather longer than the fruit, collected into a many-flowered, branched, dense panicle; seeds smooth, shining. *A. rosea*, *A. laciniata*, *A. littoralis*, are frequent plants on the sea-shore. *A. prostrata* is a coast plant, but is rare in Great Britain, and Babington suspects that it may be a maritime form of A. patula.

(Babington, *Manual of British Botany*.)

A'TRYPA (Dalman), a subdivision of the great genus Terebratula, chiefly (if not entirely) confined to a fossil state, and to the Palæozoic strata. Many of the Spiriferæ of Sowerby (as Sp. glabra, fimbriata) and some of the Terebratulæ of the same author (as T. pugnus), have been referred to this very ill-characterized genus. T. psittacea is the recent analogue.

ATTENDANT TERM. [TERM OF YEARS, P. C.]

ATTIRET, JEAN DENYS, called Frère Attiret, a French painter attached to the Jesuit mission at Peking, in the middle of the eighteenth century. He was born at Dôle in the Franche-Comté, in 1702, and was first instructed by *his father, an obscure painter* of Dôle. He completed his
studies at Rome, whither he was sent by the M
Broissia. After practising a short time at Lyon, he
Avignon, and became a lay-brother of the Jesuit
place; and when, in the year 1737, the French
Peking requested their brothers at home to send
painter, Attiret undertook to go, and set out in
year.

In China Attiret soon obtained the favour of th
Këen Loong, by presenting him with a picture of th
tion of the Kings, which he ordered to be placed in
own apartments; he however expressed a dislike to th
oils, and employed Attiret only as a water-co
Attiret became an object of envy to his Chinese
an order he received from the emperor to restore
in one of the inner apartments of the palace, a co
disagreeable as it was honourable to the French pa
was locked up in the room from seven in the m
five in the afternoon, with several eunuchs, ostens
tendance on him, but really as a guard over hi
etiquette would not allow him any convenience,
compelled to work in constant danger of breaking
a chair placed upon a table was the only scaffold he
cure. In addition to these evils, he was forced to
dinner and content himself with fruit and biscuits,
peror, in consideration of his great ability, sent him
daily from his own table, but before it reache
through the ceremonious journey it had to perfo
quite cold and spoiled. Attiret himself, in pass
from the chamber in which he was at work, was
deliver himself into the hands of various sets of eu
to await the repeated locking and unlocking of doo

Attiret met also with many vexations from t
court painters until he employed them to exec
condary portions of his works, and conformed him
degree to the Chinese taste. He found that t
painters executed the costume, landscape, and ev
much quicker and quite as well as he could do the

Between the years 1753 and 1760, when the em
Loong was at war with the Tartars on the north-w
fines of his empire, he sent to Peking for Attiret,
and prepare some designs to illustrate his triumph
arrived at the seat of war in 1754, and made ma
drawings of triumphs, processions, festivals, &c., f
he afterwards painted pictures, some of which were
in the palace, and shown only by special permis
emperor. Attiret painted the emperor's portrait,
duced a great many portraits into these drawings, of
officers, many of whom had to journey merely for th
of being painted as much as 800 leagues. Sixteen
drawings were sent to France to be engraved, und
rection of C. N. Cochin the younger. They were
by various artists, on so large a scale that it was n
make paper expressly for them. As soon as
printed, both prints and plates were sent back t
few impressions only being reserved for the roya
France and for the Parisian Library. Helman th
made a small copy of them. The originals are
Attiret; some were by the Jesuits Castiglione an
They are defective in design, and it is evident th
thors have paid too much deference to the taste of
to satisfy that of the Europeans.

The emperor created Attiret a mandarin, but by
as a Jesuit it was impossible for him to assume
distinction: he died at Peking in 1768, aged 66
peror gave 200 ounces of silver towards the exp
burial.

(*Extrait d'une Lettre du Père Amiot, du* 1 *M*
Peking, contenant l'éloge du Frère Attiret, &c.,
the *Journal des Sçavans* for June, 1771.)

ATTORNEY. By an act (6 & 7 Vict. c. 73
1843 the whole of the laws relating to attorneys a
practising in England and Wales, which were
scattered over no less than sixty statutes, were c
In the new act special care is taken to prevent
persons practising, and persons seeking to be adm
neys are subjected to a regular examination. Th
the profession, from the period of admission, an
they continue in practice, is confided to the Incor
Society, which is appointed registrar of attorney
citors. The Commissioners of Stamps are not t
certificate until the registrar has certified that
applying is entitled thereto; and the commissio
nually to deliver to the registrar all such certificat

they were granted. Persons who had discontinued
ficates to practise in the superior courts, but who
e habit of practising in the inferior courts, and at
s and assizes, are now obliged to take out certifi-
are thus brought under the controlling power of the
ed society. The act simplifies proceedings against
guilty of professional delinquency.
on, unless he has taken a degree at the universities
, Cambridge, Dublin, Durham, or London, can be
n attorney or solicitor without serving a clerkship
ars to a practising attorney in England and Wales,
undergone an examination; but a person who has
degree of Bachelor of Arts or Bachelor of Law at
he above-mentioned universities can be admitted
g served three years; but the degree in arts must
ken within six years after matriculation, and in
ight years; and the articles of clerkship must
within four years after the degree has been taken.
n important provision which enables a clerk to
year of his articles with a barrister or special
d one year with a London agent. An attorney
more than two clerks at one time, and must make
being duly enrolled within six months after he
k. Before a clerk can be admitted an attorney he
to make affidavit of having duly served, and he
oes an examination, with a view to ascertain his
apacity, by the several masters of the Courts of
ch, Common Pleas, and Exchequer, with whom
d other examiners, who are attorneys, and are
nually by the Incorporated Law Society. For
urpose eighty or ninety questions are to be an-
ch are arranged under the following heads:—
and statute law, and practice of the courts;
ing; 3, equity and practice of the courts;
and practice of the courts; 5, criminal law and
before justices of the peace. There are some
uestions, two of which are for the purpose of
what law-books have been read and studied, and
under examination has attended lectures upon

er of the Rolls has assimilated the practice of
garding notices of admission and renewal of
that of the common law courts. Every person
y admitted an attorney of these courts, or one of
he can act as a solicitor of the Court of Chan-
dergo an examination touching his fitness and ca-
examiners appointed by the Master of the Rolls
number, and any five of them are competent to
re appointed annually. On being admitted as
olicitor, the oath of allegiance is required to be
n oath to the following effect:—'I, A. B., do
ar (or affirm) that I will truly and honestly de-
in the practice of an attorney (or solicitor, as the
to the best of my knowledge and ability. So

kes some alteration in general practice, particu-
ct to costs, by enabling a solicitor to obtain the
s own bill without the expense and delay of an
certificate of the taxing-master is rendered final.
be taxed after a verdict or writ of inquiry, or
onths from the delivery of the bill, except under
nstances, nor under any circumstances after
s' payment.

EY, LETTER OR POWER OF. [Letter
Attorney, P. C.]

MENT is defined by Lord Coke to be 'an
the tenant to a grant of a seigniory, rent, or
he donee or lessee to a grant of the reversion or
An attornment was necessary in all conveyances
rvices, remainder or reversion which operated by
aw: for in such case, if there was no attornment,
void. But by the statute 27 Hen. VIII. c. 10,
t was not necessary where the estate passed by
and now, by the statutes 4 & 5 Anne, c. 16,
11 Geo. II. c. 19, § 11, both the necessity and
ornments have been almost entirely taken away.
t may be either express or implied: an express
when the tenant, after hearing the grant, ex-
reement to it, as by using any words which show
the grant; implied, when he pays rent to the
es any act acknowledging the grantee's title.
Digest; Co. Litt. 309, a.; Saunders' *Rep.*, i.
ed. 5, 1845.)

ATTRACTION. The possibility mentioned in the article Cohesion, P. C., of bringing under one law both the attraction of gravitation and that of cohesion, has been since reduced to more than a possibility, namely, to a considerable degree of presumption that the law can be actually stated. This remarkable addition to the nascent theory of molecular forces is the work of O. F. Mossotti, and was published in a pamphlet entitled 'Sur les Forces qui régissent la constitution intérieure des corps, aperçu pour servir à la détermination de la cause et des lois de l'action moléculaire,' Turin, 1836, 4to. This paper is translated in Taylor's 'Scientific Memoirs,' vol. i.; and Mr. Pratt, in the second edition of his 'Mechanical Philosophy,' observing that Mossotti's analysis, though conducted with an ultimate view to complex application, is really, for the present, only applied to simple cases, has given the mathematical view necessary to include those simple cases and no more, in a perfectly sufficient manner.

The observed facts are, that particles which are very nearly in contact with one another repel each other in a manner which certainly depends, among other things, on the temperature; but that at a certain distance they cease to repel, and begin to attract, each other, and that with considerable force; at a still greater distance that attraction becomes comparatively feeble, and coincides with what is called the attraction of gravitation, varying inversely as the square of the distance. That this attraction of gravitation, and no other (or comparatively a very small one) exists at ordinary sensible distances, is fully proved by the Cavendish experiment. [Weight of the Earth, P. C.]

Many hypothetical laws might be constructed which fulfil all these conditions; but the great interest of Mossotti's investigation, and perhaps much of its value, consists in his having taken a theory actually existing, imagined upon grounds with which his views had no necessary connexion, and upon his having given a basis of the utmost simplicity to the numerical law on which he proceeded. This basis is no other than that all molecular attractions and repulsions vary inversely as the squares of the distances.

When Æpinus explained Franklin's electrical theory, his hypothesis was that the particles of matter repel one another, and also the particles of the electrical ether, which he supposed to exist and to be attached to particles of ordinary matter. But he supposed the particles of ether to attract the particles of matter; so that of the two species of particles, called matter and ether, each repels the particles of its own kind and attracts those of the other. Æpinus even went so far as to suppose that the attraction of gravitation might be a necessary consequence of such a theory, on the supposition that the attraction of the matter and ether was a little greater than the repulsions. So far Mossotti has adopted his views; but, by applying mathematical analysis, he has shown what Æpinus could not have had the least reason to suppose, namely, that attraction of cohesion, the repulsion which takes place when the distance is smaller than that of cohesion, and the attraction of gravitation, which exists at distances too great for cohesion, are all to be found among the consequences of this theory.

If there exist in space molecules of matter which repel each other, in a fluid or ether of which the particles also repel each other, while the particles of the matter attract those of the ether, it is obvious that each of the particles of matter will, by its attraction, collect about it a condensed atmosphere of ether. If the attractions and repulsions be all inversely as the squares of the distances, Mossotti finds that, in consequence of the atmospheres of ether, two molecules at a distance r (the attraction of the particles of matter for those of ether being presumed a little, and but a little, greater than the repulsion of the particles of matter from each other) will repel each other with a force represented with great approximation by the formula

$$\frac{A(1+\alpha r)\epsilon^{-\alpha r}-B}{r^2},$$

where A, α, B are certain positive constants. To make the results agree with observed facts, α must be considerable, and A much greater than B. When the formula is positive, repulsion is represented; when negative, attraction. When r is very small, the formula is positive, and represents repulsion; when r increases to a certain value, it vanishes, and afterwards becomes negative: at the value of r just mentioned there is stable equilibrium. As r still increases the attraction increases, becomes a maximum at another certain value of r, and afterwards, if α be considerable, diminishes as the inverse square of the distance, or in a ratio incomparably near to it. All this agrees with the facts of observation, and with the numerical law of the facts as far as we know it; to which it must be added that an increase of the density of the ether would increase the distance at which particles are in equilibrium, which is generally done by increase of temperature. It is very often objected to one step that it is not two or more. We have heard, for example, the above theory reproached with not giving electricity, magnetism, and chemical affinity among its consequences. It is, nevertheless, one step: the main *mechanical* facts of cohesion, gravitation, and caloric, are made consequences of one law, which was never done before. This law may or may not be the law of nature; in the latter case it may still be valuable as a suggestion towards finding the right law.

ATTRACTION, ELECTRICAL. Under this designation it is intended to notice the apparent attractions and repulsions which take place when bodies are in particular states with respect to electrical power.

From a very early time it was known that amber, when excited by being briskly rubbed, seemed to draw towards it such light bodies as straws and feathers; and the phenomenon, as well as that of an apparent repulsion, is now exhibited in a more striking manner by presenting a cylinder of excited glass or of excited wax to a pith ball suspended by a silk line. [Electricity, P. C., pp. 335-6.]

In attempting to explain by what means these actions might arise, it is imagined that there may exist in all material substances a fluid, or fluids, whose particles exercise upon one another attractive or repulsive powers, while a mutual attraction may take place between the fluid particles and those of the substance with which they are combined.

The hypothesis of Watson and Franklin was that there exists but one kind of such fluid: it was supposed that, in exciting glass and some other bodies by friction, the fluid was abstracted from the earth through the material by which the friction was produced, and accumulated upon the surface of the body, which thus obtained more than its natural quantity. It was supposed that this excess readily passed into any body near it, provided the latter had less than, or only its natural quantity, or at most had not so great a quantity in proportion to its magnitude. In the excitement of resinous bodies it was supposed that the fluid passes from those bodies, through the material employed in the friction, to the earth; and thus the resinous bodies were supposed to have less than the natural quantities. Hence arose the distinction between positive and negative, or redundant and deficient electricity; and the theory of Æpinus and Cavendish relating to the distribution of electricity on the surfaces of bodies is in conformity with this hypothesis. But the hypothesis is open to some objections: thus, when bodies are deprived of the fluid which, when they are in the ordinary state, is combined with them, they are observed to repel each other mutually; and it must therefore be inferred that the particles of bodies exercise upon each other a strong repulsive power, a circumstance which can scarcely be reconciled with the general attraction existing among the bodies in nature, or with the cohesive power by which the particles of all bodies are held together. It is moreover impossible to conceive, as Biot observes, why negative electricity, that is, a mere absence of fluid, should be developed on the surfaces of bodies according to the hydrostatical laws by which a real fluid would be developed.

To this hypothesis succeeded that which is now generally received. It was proposed about the same time by Symmer in England and Du Fay on the Continent, and consists in the assumption of two fluids, of directly opposite qualities, existing at the same time in combination with the particles of all bodies in nature: the particles of each fluid are conceived to exert on one another a strong repulsive force, while the particles of the unlike fluids mutually attract each other. The experiments of Coulomb with the electrical torsion balance have proved that the attractive and repulsive forces vary in intensity inversely as the squares of the distances between the particles, and that at equal distances the attractions and repulsions are exactly equal.

The manner in which the mutual actions of electrical particles produce the phenomena of attraction or repulsion in bodies with which they are combined, omitting the consideration of the effects arising from the decompositions of the natural electricities of the bodies, is conceived to depend in part on the pressure of the atmosphere, and in part on the conducting powers of the bodies. Thus, if by any excitement electrical particles be collected on the surfaces of two
bodies (suppose two spheres) which are non-co
will be retained there by the pressure of the su
and by the impermeability of the material; he
must take the motions which result from the re
traction of the fluids on them, according as tho
the same or of unlike kinds. If one of the bo
ductor and the other a non-conductor, and
charged, for example, with electricity of the sa
that which is on the surface of the latter suffers
of disposition, that which is on the other moves
its substance, and is, by the mutual repulsion of
driven in abundance to the opposite side, so
dense, or to form a thicker stratum there tha
nearest to the non-conductor. But the reactio
trical fluid against the surrounding atmosphere
tional to the square of the thickness of a stra
that there is an excess of force tending to make
body recede from the other; and it is easy to
like explanation may be given of the contr
which takes place in the conducting body wh
charged with unlike kinds of electricity.

The circumstances relating to the distribution
on the surfaces of bodies agreeably to the hyp
fluids, have been determined with the aid of
analysis, by La Place, Ivory, and Poisson; and
of Electricity,' in the 'Encyclopædia Metropoli
an investigation of the distribution on the surfac
The results are there computed numerically,
with those which Coulomb has obtained by dire
and the discrepancies are found to be only s
within the limits of the unavoidable errors in t
themselves.

When a magnetized body is placed near on
so, a decomposition of the natural magnetism
takes place, similar to that decomposition of
fluids which occurs when a body in its natural s
near one which has been excited by friction
P. C., p. 337]; and all the phenomena exhibit
ized bodies on one another are capable of bein
the hypothesis of two fluids, the particles of
attract one another according as they are of t
unlike kinds, the intensities of the forces being
portional to the squares of the distances.

The hypothesis of two fluids, moving in oppo
is also adopted in order to explain the phenomen
and electro-magnetism; that which is conside
flowing from the zinc, through the acid, to the c
which is called negative, from the copper, thr
to the zinc; but the discovery that a balance
needle was affected when placed in the vicini
connecting the opposite ends of a galvanic batt
rise to an hypothesis that the power supposed t
was called by the general name of an electric
duced by a spiral motion of the fluid current
ducting wire, or about the particles of a magnet

Oersted, the discoverer of the electro-magnet
ceived that, when the circuit was completed by
ing from the zinc end to the copper end of a bat
tive and negative fluids which, if unimpeded,
straight lines, were compelled by acting against
move spirally about the wire; and this opinion
rally held, it being supposed that the turns of
very near one another, so that they may be
circles whose planes are perpendicular to the ax
The course of either current, according to t
given by Mr. Barlow, may be easily understood
lowing description, which relates in particular to
called positive. Let a conducting wire be ima
bent that part of it shall be in a vertical posi
pass perpendicularly through the paper, the p
ceeding from the zinc or positive end of the ba
part below to the copper or negative end; the
sitive electricity being thus from above downw
also, a small needle whose north and south po
sented by *n* and *s* to be horizontally balanced
placed successively at different points in the ci
a circle described about the intersection of the
paper. Then, the directive power of the earth
being neutralized by the presence of a magnet, t
assume in every part the position of a tangent t
ference; the direction *ns* being always such as it
point *s* revolved in advance of *n* round the axis
the same order as the hands of a watch move,

P. C.] The negative current may be understood
ing at the same time in like manner, but in a con-
ion. The currents thus revolving are supposed to
particles of the magnetized needle, disposing them
themselves parallel to its axis, and so as to bring
in the position of a tangent to the curve described
d about the wire.

pothesis of Ampère differs from that which has
tated: this philosopher having formed the conduct-
nto two parts which could be so connected with the
oles of a galvanic battery that the current of posi-
ricity might be made to pass along the two parts in
direction, or in contrary directions, found that, in
r case, the wires (which were delicately suspended in
and parallel positions) seemed to attract, and in the
e to repel one another. He from thence inferred
uids passed in rectilinear directions, or parallel to
f the wires, and that the particles were so polarized
ct to each other, laterally, when they moved in the
tion, sides which had powers of attraction; and
moved in contrary directions, sides which had
pulsion: he further supposed, in order to account
t of the wires on a magnetized needle, that mag-
ts revolve about every particle or rather every
nt of a magnetized body, as it were in the plane
to an infinitely small sphere; and he assumed
in the conducting wire of a battery exerts actions
volving currents, by which the planes of the re-
brought into such positions that, if produced,
pass through the axis of the conducting wire.
however that the effect thus produced on the
same as that which was before described; for,
of the revolving currents are supposed to be per-
the axis of the magnetized body, that axis must
e itself in the direction of a tangent to a circle
be perpendicular to the axis of the conducting
attery.

n ascertained that the current of electricity pro-
electrical machine causes deviations in a mag-
lle; and it is now generally believed that the
anic, and magnetic fluids, if such there be, are
An experiment made by Mr. Faraday, in which a
needle caused to float on water was found to enter
having its axis on a level with the surface and
a galvanic conducting wire was spirally wound;
agnetized needle would not enter the bore of a
et placed in the same situation as the glass tube—
ever to show that the nature of the galvanic and
ids was not absolutely the same. But M. Am-
lanation, has observed that the result of the ex-
not inconsistent with the hypothesis of identity;
the wire is coiled about the glass tube, the needle
e electric current, whereas it is outside of the
t the particles of the magnetic tube.

TION OF BALLS. [Weight of the Earth,

TION OF MOUNTAINS. [Attraction,

TIONS, ELECTIVE. This name is given to
cies by which the particles of bodies unite, or
ther, to form other bodies; and, as these ten-
in different degrees between the particles of
ies, the name is intended to denote an apparent
particles of one kind in preference to those of
[Affinity, P. C.]

OD, THOMAS, a composer of great eminence,
guished by his productions for the church, the
the theatre, was born in 1765, and commenced
al education, as one of the 'children of the
l,' under Dr. Nares, and his successor, Dr. Ayr-
change of his voice, and consequent retirement
g's service, he was sent abroad, by and at the
s patron, the Prince of Wales, for the purpose of
s studies in the schools of Italy. He first went
here he continued two years, receiving some in-
n Filippo Cinque, and more from Gaetano La-
the ephemeral favourites of the last age. But
g young student, seeing that the musical art was
e decline in the country where it had flourished
that it was renovated and in full vigour in Ger-
ded to Vienna, and immediately became the
rt, with whom he formed an intimacy which led
rcourse, and to the imparting not only the usual information, but also a knowledge of those deeper recesses of the art which seldom, if ever, is, or can be, communicated in the course of ordinary lessons. This happy result is manifest in all Attwood's secular compositions, and was recognised by the great master, who said—according the report of Michael Kelly, the singer—'Attwood partakes more of my style than any pupil I ever had.' (Kelly's *Reminiscences.*)

Soon after the young Englishman's return to his native country, his royal patron made him one of his chamber musicians, an appointment however which he soon relinquished, his friends not thinking it altogether compatible with the station he was entitled to hold. On the arrival of the Duchess of York in this country he became her 'musical preceptor;' and on the ill-fated marriage of the Prince of Wales (afterwards George IV.), he was constant in his attendance on the princess, to whom he gave almost daily lessons. In the conscientious performance of this duty, which he continued to fulfil after it became evident that any slight shown to his illustrious pupil would not be displeasing in another quarter, he gave offence to his patron, who, for several years after, made his resentment felt.

In 1795 the dean and chapter of St. Paul's elected Mr. Attwood as organist of that cathedral; and in the following year, on the death of Dr. Dupuis, he was appointed composer to the Chapels-Royal. For the solemnity of the coronation of George IV., he was required officially to compose an anthem, when he produced 'The king shall rejoice,' a grand work which has since been heard and admired in all parts of the kingdom. This restored him to the favour of his early protector. It fell to his lot to be called on a second time to contribute to the ceremonial of a coronation, and for that of William IV. he composed the anthem, 'O Lord, grant the king a long life,' another great work, and in all respects equal to the former. In 1837 he was, without solicitation, appointed, by the bishop of London, to succeed Mr. Stafford Smith, in the office of organist of the Chapels-Royal. 'It was willed however that he should enjoy this spontaneous tribute to his merit only a few months.' He died in March, 1838, and his remains were deposited in St. Paul's Cathedral, under his own organ, with every honour that the church to which he belonged, the choirs of the Royal Chapel and Westminster Abbey, and the most distinguished members of his profession, could confer.

Mr. Attwood's compositions are so numerous, in each of the classes before named, that we can only say, generally, that a more than usual proportion of them are likely to reach distant posterity. His cathedral works, which unite the elegance of the modern school with the becoming sobriety of English church music, are, with one or two exceptions, unpublished; but it is to be hoped, both for the sake of the author and of the public, that his representative will not allow such undeniable proofs of his father's genius—compositions which will add so much to the resources of our choirs—to remain any longer in comparative obscurity.

AUCUPA'RIA. [Pyrus, P. C.]

AUDIANS, or AUDEANS, a sect of heretics, so called from their founder Audius, or Audeus, who is said to have been a native of Mesopotamia, and who lived in the fourth century. Having begun, as usual with religious reformers, by attacking the manners of the clergy, and perhaps also the government of the church, he proceeded in this line till he was expelled from the body of the faithful; upon which he assumed the episcopal office, and was hereupon immediately banished by the emperor Constantius to Scythia. This is stated to have been about the year 338. Among various erroneous opinions and practices attributed to Audius and his followers are the celebration of Easter after the usage of the Jews, the admission of all descriptions of persons indiscriminately to the Lord's Supper, the doctrine of the eternity of fire, water, and darkness, and especially that of anthropomorphism, or the resemblance of the Deity to the human form. This last heresy, in particular, which, as a Christian article of faith, appears to have originated with Audius, spread extensively. 'The pilgrim Cassian,' Gibbon writes, 'who visited Egypt in the beginning of the fifth century, observes and laments the reign of anthropomorphism among the monks, who were not conscious that they embraced the system of Epicurus.' (*Dec. and F. of Rom. Emp.*, chap. 47, note.) But we have no account of the tenets of Audius, either from himself or any of his followers: we are dependent for all we know of him upon the statements of the orthodox theological writers of that and the next age, Athanasius, Augustine, Epiphanius, and Theodoret. He is admitted to have been a person of learning, and Epiphanius acknowledges that in his exile he exerted himself with great success in converting the barbarians.

AUGMENTATION, COURT OF. This was a court established by 27 Hen. VIII. c. 27, for managing the revenues and possessions of all monasteries under 200*l.* a year, which by an act of the same session had been given to the king, and for determining suits relating thereto. The court was to be called 'the Court of the Augmentations of the Revenues of the King's Crown,' and was to be a court of record with one great seal and one privy seal. The officers of the court were, a chancellor, who had the great seal, a treasurer, a king's attorney and a king's solicitor, ten auditors, seventeen receivers, with clerk, usher, &c. The oaths of the different officers are given in § 4 of the act. All the dissolved monasteries under the above value, except those preserved incorporately, were in survey of the court, and the chancellor of the court was directed to make a yearly report of their revenues to the king. The annual revenue of 376 monasteries under 200*l.* a year, which were suppressed, was 32,000*l.* and the value of their goods, chattels, plate, &c. was estimated at 100,000*l.*

The records of the Court of Augmentation are now at the Augmentation-Office in Palace-Yard, Westminster, and may be searched on payment of a fee.

AUGUSTI, CHRISTIAN JOHANN WILHELM, a celebrated German theologian, was born on the 27th of October, 1771, at Eschenberge, a village near Gotha, where his father was pastor. After receiving his preparatory education in the gymnasium of Gotha, in 1790 he entered the university of Jena, where, under Griesbach, he devoted himself to theology and philology. After the completion of his studies several years passed before he obtained an appointment, but although he had to struggle with great difficulties in gaining a livelihood, he still continued his studies with great activity: he began his literary career by contributions to theological journals, and at length in 1798 he resolved upon entering on the career of an academical teacher at Jena. In 1800 he was made professor extraordinary, and in 1803 he succeeded Ilgen in the chair of Oriental literature, which he exchanged in 1807 for that of theology. The popularity of his lectures and the many valuable works which he published during his residence at Jena, not only induced the Duke of Saxe-Weimar to make him a member of his consistory, but other German universities made great efforts to draw him from Jena. In 1811 however he accepted the chair of theology in the university of Breslau, to which he was invited by the Prussian government, and in addition to which he was honoured with a seat in the consistory of the province of Silesia. Augusti, who had hitherto chiefly distinguished himself as a writer upon theology and ecclesiastical matters, had now ample opportunities for displaying the practical character of his mind. His influence upon the university of Breslau and upon all the educational establishments of Silesia was very great. At the time when the French marched into Russia, Augusti was rector of the university, and it was owing to his intrepidity and patriotic spirit that the property of the university was saved. His conduct was severely censured by the timid, and those who would have yielded to the enemy, but the calumnious reports which had been spread about him were soon shown in their true light, and the Prussian government acknowledged its gratitude to him by various honourable distinctions. In 1819 Augusti was honoured with the chief professorship of theology in the newly established university of Bonn, and with the title of Councillor of the Consistory at Cologne. The influence which he exercised over the Protestant Church in the Rhenish province of Prussia rapidly increased, and in 1833 he was placed at the head of the ecclesiastical affairs of that province, by being appointed director of the consistory of Coblenz. Notwithstanding the numerous duties which this office devolved upon him, he still continued his lectures in the university until his death on the 28th of April, 1841.

Augusti was one of the most voluminous theological writers of Germany. He was originally led by the influence of Griesbach to join the critical or philosophical school of theology, but this did not suit his natural bias, which was more inclined to maintain things as they are than to speculative investigations, and during the last forty years of his life he was a zealous advocate of the established form of religion, without being in the least degree bigoted. As far as his doctrines go, he may be considered an orthodox Lutheran. His writings, most of which are of an historical or archaeological nature, are very useful as works of reference; but they are deficient in elegance and simplicity of form, an
evidence of learning and industry than of the
historian. The following list contains the mo
his works:—1, 'Exegetisches Handbuch de
ments;' 2, A continuation of Berger's 'Prakti
in das Alte Testament;' 3, 'Apologien und P
logischen Inhalts;' 4, 'Memorabilien des Or
buch der Christlichen Dogmengeschichte,'
8vo.; 5, Historisch-Kritische Einleitung in
ment,' Leipzig, 1806, 8vo.; 6, 'System de
Dogmatik nach dem Lehrbegriff der Lutheri
Leipzig, 1809; 7, Denkwürdigkeiten aus de
Archaeologie,' 12 vols. 8vo., Leipzig, 1817-3
most important of all Augusti's works; he su
densed it into a Manual of Christian Archaeol
buch der Christlichen Archaeologie,' 3 vols.
1836-37; 9, 'Versuch einer Historisch-Dog
leitung in die heilige Schrift,' Leipzig, 1832,
toriae Ecclesiasticae Epitome,' Leipzig, 1834,
träge zur Christlichen Kunstgeschichte und
this work only one volume was published whe

(*Jenaische Allgemeine Literatur-Zeitung,*
Intelligenzblatt, p. 66, &c.; *Biog. Dict.* of
the Diffusion of Useful Knowledge.)

AULA'CODON. [Chelodus, P. C. S.]

AU'LOLEPIS, a fossil genus of Cycloid
chalk of Sussex and Kent. (Agassiz.)

AULO'PORA (Goldfuss), a fossil genus
from the Silurian strata.

AURELIANUS, CÆLIUS. [Cælius
P. C.]

AUST CLIFF. In the bone-bed of this
usually classed with the lias formation, occur
remains which appear to belong also to the
This has been thought a sufficient reason for
beds out of the lias. But if we regard the
and geological relations, this displacement
allowed.

AUSTEN, WILLIAM, an English metal
fifteenth century, and the contemporary of Don
berti, the most renowned of his foreign rivals.
resting document respecting Austen and other
preserved by Sir William Dugdale in his '
Austen had a great share in the construction o
tomb at Warwick, in St. Mary's church, of Ri
champ, earl of Warwick, who died in 1439. I
in question, which is the covenant between the
and the artists to be employed in the constructi
&c., William Austen is styled 'citizen and fo
don,' from which and the details of the agreem
highly interesting, it appears that he was not
modeller of the figures which he cast in bras
pressly stated that he is to work from models
'Will. Austen, citizen and founder of London,
H. 6, covenanteth, &c. to cast, work, and per
of the finest latten (brass) to be gilded that
xiv. images embossed, of lords and ladies in
called weepers, to stand in housings made ab
those images to be made in breadth, length,
&c., to xiv. patterns made of timber. Also
xviii. lesse images of angells, to stand in oth
shall be appointed by patterns, whereof ix. afte
ix. after another. Also he must make an hea
the tombe above and about the principal imag
in the tombe according to a pattern; the st
manship to the repairing to be at the charge of
Austen. And the executors shall pay for ev
shall lye on the tombe, of the weepers so
xiii.*s.* iv.*d.* And for every image of angells
And for every pound of latten that shall be in
And shall pay and bear the costs of the said Au
the said images and hearse.'

'The said William Austen, xi. Feb. 28 H.
nant to cast and make an image of a man arme
ten, garnished with certain ornaments, viz. w
dagger; with a garter; with a helme and c
head, and at his feet a bear musted (muzzled)
perfectly made of the finest latten, according t
of which to be brought to Warwick and layd
at the perill (risk) of the said Austen; the ex
for the image, perfectly made and layd, and all
in good order, besides the cost of the said wo
wick, and working there to lay the image, an

arriages, all which are to be born by the said exe-
tal xl.li.'
inion of Flaxman, these works of Austen are equal
done in Italy at the same time, and though he is
only as the founder, he may possibly be the de-
e figures, as the patterns spoken of in the cove-
ave been made in relation to size and costume, and
t models to prepare the casts from. The pay of
r making a brass figure appears small, but it was at
he price of an ox. The tomb itself cost 125*l.*, the
e earl 40*l.*, and there was an additional expense of
ding. The whole expense of the tomb and the
which it is placed, called Beauchamp Chapel, was
7*d.* The other artists employed in this monument
n Essex, marbler; Thomas Stevyens, copper-
n Bourde, of Corffe Castle, marbler; Bartholomew
t, Dutch goldsmith, of London; John Prudde, of
r, glazier and painter on glass; John Brentwood,
teyner of London; and Kristian Coleburne, also
steyner of London. The monument, one of the
best in England, is still in a state of preservation,
ass; the meaning therefore of the word latten,
en disputed, is evidently brass.
Antiquities of Warwickshire, p. 446.)

JANE, was born December 16, 1775, at
Hampshire, of which place her father was rector.
as himself a man of more than average literary
and he bestowed upon Jane an education su-
was then general among females of her rank in
if education did much for her, nature did more,
with considerable beauty of both features and
weetness of disposition, good sense, and an in-
gagingness of manner. During the latter years
's life she resided chiefly at Bath, but after his
idow and her two daughters retired to South-
e they continued till May, 1817, and after-
village of Chawton, where Jane wrote her
e they remained until her declining health ren-
able that they should remove to Winchester for
tter medical advice. She died July 24 of that
buried in the cathedral.

novels, four were published in her lifetime, but
—'Sense and Sensibility;' 'Pride and Preju-
sfield Park;' and 'Emma.' The two others,
Abbey,' and 'Persuasion,' did not appear until
r her death—an extraordinary circumstance as
rmer, that being her first production, and having
actually disposed of to a publisher, who never-
t think fit to bring it out. Her novels are all of
lass—are all of them delineations of every-day
society, entirely free from that 'professional'
y as to characters and incidents which gives a
al quality to nearly all productions of the kind.
to the classification of critics, they do not belong
t rank of that species of fiction, they exhibit ex-
aphic power and truthfulness, and reality with-
on. Nor is it their least merit that they are all
oral and healthful tendency, without any parade
They have all been translated into French by
ontolieu and others.

LIA, SOUTH. [South Australia, P. C. S.]

JA'COPO DI PAOLO D', a celebrated old
of the fourteenth century; he lived at Bologna,
e was a Venetian or a Bolognese is doubtful.
antient noble family of Bologna of the name of
ich Jacopo may have been a member, but there
ainter at Venice, who, with more probability,
the father of Jacopo. This was Maestro Paolo,
wn painter of that city. In the sacristy of the
tuali there is a painting by him with the follow-
—'1333, Paulus de Venetiis pinxit hoc opus;'
estro Paolo may have been only the master of
as not an uncommon practice in the earlier cen-
ters to sign simply their Christian names fol-
of their master or father upon their works, as
e of Jacopo di Paolo, who in his earliest works
'Jacobus Pauli,' but in his later 'Jacobus de
anco Bolognese and Vitale dalle Madonne are
ve been his masters, but without the slightest
copo was himself sometimes called Dalle Ma-
e he, as well as Vitale, painted at one time
vely Madonnas.
enerally mentioned in company with Simone da Bologna, or Simone de' Crocifissi, or Il Crocifissaio, as he was called, for the same reason that Jacopo was called Dalle Madonne. They became partners, and each painted a part of their joint productions, a circumstance which has led to the error of treating of them as of one family: Simone's name was not Avanzi, but Benvenuti, according to the manuscript of Oretti.

Most of Jacopo's works have perished, but some remain. The frescoes of the chapel of San Felice, formerly San Jacopo, in the church of Sant' Antonio at Padua, which were long attributed to Giotto, were painted by Jacopo in 1376. He painted also, in partnership with Simone, many frescoes in the old church of the Madonna di Mezzaratta, without the Porta San Mamolo at Bologna, which were much praised by Michelangelo and the Carracci, considering their period. Besides which he painted two triumphs in a public hall at Verona, and some works in company with Aldighieri da Zevio in the chapel of San Giorgio in the church of Sant' Antonio at Padua. The former were considered works of extraordinary merit by Mantegna; the latter have been lately recovered from dirt and oblivion by Dr. E. Förster, one of the editors of the Kunstblatt. They were described by him in that journal, pp. 16 and 22, of the year 1838. Jacopo died probably in the early part of the fifteenth century. There are two pictures attributed to him in the gallery of Bologna.

(Vasari, *Vite de' Pittori*, &c., and the *Notes* to Schorn's German translation; Malvasia, *Felsina Pittrice;* Lanzi, *Storia Pittorica*, &c.; Giordani, *Pinacoteca di Bologna.*)

AVE'NA—*Medical Properties of.* Several varieties, chiefly of the species *A. sativa*, are cultivated in Britain, particularly the north of England and lowlands of Scotland, though on the east coast of Scotland the cultivation extends to the most northern limit of the kingdom. The climate of Scotland is peculiarly suitable to the profitable cultivation of this plant, which flourishes where wheat and even barley languish [Oats, P. C., vol. xvi. p. 383], while the constitution of its seeds renders it the most appropriate article of diet for the inhabitants of that country. The seeds, which are officinal, are at once dietetical and medicinal. The fruits or grains consist of the skin or husk, which is removed by machinery, and the seeds, which, when coarsely ground, form the well-known oatmeal. The relative proportion of these varies in the different varieties, and in different seasons and localities. Vogel, who is commonly followed on this point, gives the amount at 66 meal and 34 bran or husks; but under proper culture, it is often as high as 78 meal and only 22 of husk per cent. (Boussingault, *Rural Economy*, translated by G. Law, p. 228.) The meal or farina consists (per cent.) of starch 59 (sometimes as high as 72·8, Dr. Christison), 10·75 of saccharo-mucilaginous extract, 4·3 of albumen, 2 oleaginous matter, 24 ligneous fibre and moisture. The seeds, deprived of husks, or decorticated (*grutum*), are employed under the name of groats or grits to form with water the Decoctum Avenæ, or water-gruel. When bruised, ready for use, they are denominated Embden grits, or prepared or patent groats or grits. A greater or smaller quantity of these are to be used to a pint of water, according to the object in view. When employed for an article of nourishment, the gruel may be made thick; when required as a demulcent or diluent, to promote perspiration at the commencement of a cold, it should be thin; and the addition of butter, spices, and wine, or anything save a little salt and sugar, is to be avoided. This is regarded as a light and digestible article for invalids. With some, it readily produces heartburn, and the same objection is urged against oatmeal, whether eaten in the form of oat-cakes, or employed to form porridge, the usual breakfast of the labouring classes, and of the children of the middle classes in Scotland and even Ireland. This in a few instances is certainly true; but as a national fare, nothing could be found more fitting. It gives a warmth and support to the system, far superior to wheaten bread, and therefore most proper for a cold and damp climate. The Derbyshire miners, from choice, use in winter oaten cakes, 'finding that this kind of nourishment enables them to support their strength and perform their labour better.' (Sir Joseph Banks, in Davy's *Agricultural Chemistry*, 5th ed. p. 143.) The idea that oatmeal is the cause of cutaneous diseases seems devoid of foundation. (Cullen's *Materia Medica*, vol. i. p. 279.) The husks are frequently steeped in water for a few days, and then drained off. The liquid when boiled stiffens into a dish called sowens in Scotland. This is slightly acid, and forms with milk a favourite food of the peasantry for supper. Its cooling properties render it a most suitable article of diet in summer, in a climate where, for a short peri[illegible] he heat is intense.

When oats are used as food for horses, it is very advantageous to steep them in water for two or three days, till they sprout or spire; the saccharine matter is thereby developed, and they become more nutritive and digestible.

AVERAGE. [Ships, P. C., p. 403.]

AVERMENT. [Pleading, P. C.]

AVES (Fossil). Fossil birds have been recognised by bones and foot-prints in the red-sandstone of Connecticut (Hitchcock), in the Wealden of Sussex (Mantell), in the chalk of Maidstone (Owen), in the tertiary beds of England and France (Cuvier), in the bone-caves of Kirkdale (Buckland), and in many late deposits. From New Zealand comes the Dinornis of Owen.

AVICENNIA, a genus of plants belonging to the natural order Myoporaceæ. The calyx is 5-parted, persistent, the segments erect, subovate, obtuse, concave; the corolla monopetalous, 2-lipped, upper lip square, emarginate, flat, lower bifid, with ovate, equal, flat divisions, tube bell-shaped, short; the stamens 4, didynamous; ovary 2-celled; style, subulate, erect, length of stamens; the stigma bifid, acute, the lower division bent down; the seed single, large, albuminous. The species are natives of New Holland and America.

A. tomentosa, White Mangrove, has cordate, ovate leaves, tomentose beneath. It puts forth twigs from the stem, resembling those of the common mangrove. The bark is found to contain tannin, and is used in Rio Janeiro for tanning.

A. resinifera is a native of New Zealand, and is said by Forster to yield a green resinous substance that is eaten by the New Zealanders as food. It is remarkable also for its clusters of large flowers. *A. nitida* is a native of Martinique.

(Burnett, *Outlines*; Lindley, *Natural System*.)

AVI'DIUS, CA'SSIUS. [Cassius Avidius, P. C. S.]

AVOIDANCE OF A BENEFICE. [Benefice, P. C.; Cession, P. C.]

AVOWRY. [Replevin, P. C.]

AWARD. All that is necessary on this subject is contained under Arbitration, P. C.

AXI'NUS (Sowerby), a fossil genus of Conchifera, of which some species occur in the magnesian limestone, and one in the London clay. To those which are found in the magnesian and other palæozoic limestones, Mr. King applies the title of Schizodus, P. C. S.

AXIS, in Botany, a term that is applied to the root and stem of the whole plant. The result of placing the seed of a plant in a place fitted for its growth, is the development of the embryo. The plumule ascends into the air, whilst the radicle descends towards the earth. The former is said to be the *ascending axis* of the plant, the latter the *descending axis*. It is around these axes of growth that all other parts of the plant are arranged. Those which are found upon the ascending axis, or stem, are collectively termed the *appendages of the axis*, and individually constitute the scales, leaves, bracts, flowers, sexes, fruit, and modifications of those parts of the plant; all these parts are in connexion with the vascular system of the axis, and must not be confounded with mere expansions of the epidermis and the like, such as ramenta, thorns, &c., which have no real connexion with the axis.

The cause of the direction taken by the ascending and descending axis of plants has been variously explained. This is evidently a complicated question, and one which involves the great mass of facts in the organization of plants, and probably animals, which determine their peculiar forms, habits, and movements. Dutrochet, who has lately written on this subject, and who is quoted by Lindley in his 'Introduction to Botany,' says:—'The downward direction of the roots may appear easy of explanation: it may be said that, like all other bodies, they have a tendency towards the centre of the earth, in consequence of the known laws of gravity (as is the opinion of Knight in 'Phil. Trans.' for 1806); but on what principle then is to be explained the upward tendency of the stem, which is in direct opposition to those laws? And here lies the difficulty. Dodart is the first who appears to have paid attention to this circumstance; he pretends to explain the turning backwards of seeds sown in an inverted position, by the following hypothesis:—He assumed that the root is composed of parts that contract by humidity; and that the stem, on the contrary, contracts by dryness. For this reason, according to him, it ought to happen, that when a seed is sown in an inverted position, the radicle will turn back towards the earth, which is the seat of humidity; and that the plumule, on the contrary, turns to the sky, or rather atmosphere, a drier medium than the earth. The experiments of Du Hamel are well known, in which he attempted to force a radicle upwards and a plumule downwards by enclosing them in tubes which prevented the turning back of these parts. It was found that as the radicle and plumule could not take their natural direction, they became twisted spirally. These experiments, while they prove that the opposite tendencies of the radicle and the plumule cannot be altered, still leave us in ignorance of the cause of such tendencies.' The well-known fact of the stems of plants seeking the light when confined in dark places, has led De Candolle and other observers to attribute the tendency of the stem to an upward growth to the influence of light. Another well-known fact, that of the tendency of the roots of plants to grow towards water, or moisture, might have suggested water as a cause of the tendency of the root to grow downwards. Observing that the ascending axis of plants is always coloured, and that the descending axis is white, Dutrochet suspected that the action of light on the coloured parts of the plant was the cause of its growing upwards. He found by experiments on the Mirabilis jalapa and other plants, that although roots have in general no tendency towards the light, yet such a direction does become manifest provided the terminal shoot of the root becomes slightly green, as occasionally happens. He found that the ends of the roots of Mirabilis jalapa became occasionally coloured, and, on placing the plants in damp earth, he found these roots had a tendency to come to the surface towards the light. Not only is this the case, but the colourless stems of such plants as Sagittaria sagittifolia are known to assume the directions of roots. In this plant 'shoots are produced from the axillæ of all the radical leaves which grow at the bottom of the water. These shoots have their points directed towards the sky, like those of all vegetables. The young stems which are produced by these shoots are entirely colourless, like roots; and instead of taking a direction towards the sky, as coloured stems would do, they lead downwards, pointing towards the centre of the earth. The subterranean stem next takes a horizontal course, and does not assume any tendency towards the sky until the points become green.'

Herr von Kielmeyer gave a report on the direction of the organs of plants, to the assembly of naturalists at Stuttgart in 1835, in which he explained the upward and downward growth of the axis of plants by the theory of polarity. He supposes that there is acting upon plants a principle the analogue of magnetism and electricity, which, polarizing the cells of which a plant is composed, give to one set an upward and to another a downward growth. Although every writer on the subject has endeavoured to give to one agent the position of a cause in this phenomenon, it will be found on inquiry that the particular directions of the stems of plants can no more be referred to one cause, than the growth in particular directions of the organs of animals. Growth, in whatever direction is the result of all the forces that are acting on an individual organism; and therefore there can be little doubt that gravitation, light, the chemical constitution of the tissues, and electrical agency are all involved in producing the determination of the particular direction of the roots and stems of plants.

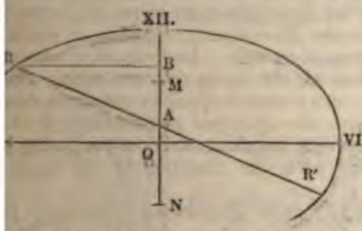
(Meyen, *Pflanzen-Physiologie*; Lindley, *Introduction to Botany*; Dutrochet, *Ann. des Sciences Naturelles*, [illegible] 1833.)

AYLIFFE, JOHN, LL.D., an English jurist, of the circumstances of whose life hardly anything is known. He left behind him in his works substantial monuments of his industry and learning. He styles himself Fellow of New College, Oxford. In 1714 he published in 2 vols. 8vo. 'The Antient and Present State of the University of Oxford,' a work of which a great portion is avowedly an abridgment of Wood's 'Athenæ.' In 1726 he published in folio 'Parergon Juris Canonici Anglicani, or a Supplement to the Canons and Constitutions of the Church of England,' in which he brings much learning and research to bear against the exercise of a separate and independent legislative power by ecclesiastical bodies. In 1732 he published 'The Law of Pledges and Pawns as it was in Use among the Romans;' and in 1734, in a large folio volume, a 'Pandect of the Roman Civil Law, as anciently established in that Empire,' &c. This volume covers the greater part of the author's subject, but the complete work was never published. Ayliffe's books give an explanation of those scientific terms of reference to the Corpus Juris which often puzzle casual readers of the foreign civilians.

AYMESTRY LIMESTONE, one of the calcareous bands in the upper Silurian series, which has been produced by ll accumulations amidst the masses of argillaceous It is not traceable beyond the districts of Lud-ey, Malvern, Woolhope, May hill, and Usk. racterised by Pentamerus Knightii.

N, SIR ROBERT, was born in Fifeshire, of an old e year 1570, and followed King James I. to London nion of the crowns. He seems to have spent the f his life principally in attendance on the king's lding several places at court. He died in the Whitehall, in 1638, and was buried in Westminster ere there is still a monument to his memory. The oetarum Scotorum' contains a considerable number l poems of his, in Latin hexameter and elegiac s English poems were neglected and scattered ny of them probably never finding their way into o or three of these however have long been known l though not always attributed to their true author. on of them was printed a few years ago, in the of the Bannatyne Club;' and a volume entitled of Sir Robert Aytoun,' edited by Charles Roger, 844, contains all the poems attributed to him in es. It includes a good many English verses blished, that had been found (though in a mo-graphy) in a manuscript accidentally discovered. n poems, although creditable to his Latinity, little notice. His English poems are greatly ng and original; and there are very many of e are quite willing to attribute to a man whose boasted of by Ben Jonson, and whose verses by Dryden and imitated by Burns. Those arkable as being probably the earliest attempts cottish writer to compose verses in the language ome peculiar to the southern part of the island. et more valuable for the grace and animation s the best of them, especially those of a spor- for that clear pointedness of expression which ughout the series, and which often reminds one nanner of Jonson.

I or ANALEMMATIC DIAL is one whose el to the horizon, and whose gnomon, or stile, a vertical position. The hour-points are in of an ellipse, as VI, XII, VI, of which let O and the foot of the style moves in a north and MN, which is graduated from O to M and from ents of the sun's declination, from zero to 23½ adius of the circle being equal to the eccen-ellipse. To these graduations are annexed as nding days of the months as can be intro-



investigate the place of any hour-point, as R, let A be the foot of the style for any given day. Then AR will be the direction of the shadow for the given hour; and there must be found the azimuthal angle MAR, or its supplement MAR′. Now the sun being in the plane of the hour-circle which cuts the horizon in RAR′, and it being understood that, in the celestial sphere, there may exist a spherical triangle formed by arcs joining P the pole of the equator, S the place of the sun, and Z the zenith of the place, or the point vertically above O [see fig. to Azimuth, P. C., and imagine S to be put in place of ☉], we shall have PZ the co-latitude of the place, PS the sun's north-polar distance, and the given hour-angle at P; to find the angle at Z (=MAR′ or MAR).

In that triangle we obtain [Spherical Trigonometry, P. C., page 343, formula 6],

$$\text{cotan } Z = \frac{\cos ZP \cos P - \text{cotan } PS \sin ZP}{\sin P}$$

But RB (fig. above) being let fall perpendicularly on OM produced if necessary, let $OB=x$, $BR=y$, $OA=x'$; then

$$\text{cotan } MAR \ (=\text{cotan } Z) = \frac{AB}{BR} = \frac{x-x'}{y}.$$

Equating these values of cotan Z, there is obtained $x' = \dfrac{x \sin P - y \cos ZP \cos P + y \sin ZP \text{ cotan } PS}{\sin P}$.

This equation containing three unknown quantities, the problem is indeterminate; but, since the following conditions must be satisfied, the values of x and y may be found:—First, the position of R, the hour-point, must be independent of the sun's polar distance; therefore x and y must be independent of PS, which gives

$$x \sin P - y \cos ZP \cos P = 0;$$

also x' must be independent of the given hour; whence $\dfrac{y \sin ZP}{\sin P}$ must be considered as constant; let the constant be represented by m; then

$$y = \frac{m \sin P}{\sin ZP} \text{ and } x' = m \text{ cotan } PS.$$

From the equation for 0 we have

$$x = y \cos ZP \text{ cotan } P,$$

and substituting the value of y,

$$x = m \text{ cotan } ZP \cos P.$$

Squaring the values of x and y, and adding the results together, there is obtained, after reduction,

$$\frac{x^2}{m^2 \text{ cotan}^2 ZP} + \frac{y^2}{m^2 \text{ cosec}^2 ZP} = 1,$$

which is the equation to an ellipse, having for its semitransverse axis m cosec ZP, and for its semi-conjugate axis m cotan ZP.

The constant m may be taken of any magnitude at pleasure according to the intended scale of the dial; thus the ellipse may be traced. The hour-points may be found by giving to the angle P successive values, as 15°, 30°, &c., and corresponding values for the half-hours, quarter-hours, &c. in the above values of x and y.

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B

rather BABBER, is an island of the Indian
and sometimes included in the Moluccas; but it
y be included in the large group which is called
Islands. Babber lies between 7° 45′ and 8°
is traversed by 130° E. long. According to
it may be about 20 miles long and 10 miles
surrounded by several smaller islands, of which
Wetang, which lies west of it; and between
anchorage in from 14 to 160 fathoms. The
tainous, but does not rise to a great elevation,
s the extremity, where a summit rises to a con-
ht. The interior of the island is uninhabited,
western and eastern shores, where there are
ts. They constitute two independent commu-
re continually at war with one another; and
bject of their military incursions is to kidnap
who are sold as slaves to the vessels that visit
bliged to cultivate the fields for their captors.
rt of the island is still covered with trees and
e remainder is cultivated, and produces several
Indian corn, and plantains. There are also
lantations of cocoa-nuts and sago-trees. The
ls are cattle, hogs, and goats. Fowls and
ous, especially several kinds of pigeons. Fish
; but the natives do not turn it to account.
s belong to the Malay race, and resemble in
dress, and food the inhabitants of the neigh-
They have a few prahus, from 10 to 20 tons
hich they occasionally visit the neighbouring
does not appear that they have any regular
mmodities with them. There come every year
or two country vessels from Banda, which im-
s of cotton-cloth, and export a few slaves and
. When the Dutch spread over the Indian
ey had a small establishment on this island;
ned it after some time, and it does not appear
ants have reaped any advantage from the stay
Lately however the Dutch government has
me communication with them.
door den weinig bekenden zuidelijken Moluk-
)

SA. or BABYROUSSA. [Suidæ, P. C.]
(Βάβριος). Since the publication of the article
P. C. a considerable number of his fables have
and published. Among the numerous MSS.
oides Minas found in the convents of Greece,
containing the choliambic fables of Babrius,
l in the convent of St. Laura on Mount Athos.
of it (the price which the monks asked for
ing too exorbitant), and brought it with the
ures to Paris in 1842. M. Villemain entrusted
ing the fables to M. J. F. Boissonade, and the
towards the end of 1844 in one octavo volume.
les which were thus rescued are now before
are not however the complete collection which
Their number is 123; they are arranged in
der, that is, according to the initial letters of
he present collection does not go further down
O. A considerable number of fables is there-
g. The whole collection is divided into two
e extending from the letter A to L, and the
o O inclusive, and each of them is preceded
. The age at which the poet Babrius lived,
formerly believed to have been the last century
ristian æra, is at present more doubtful than
t of certain allusions which occur in the fables.
who believes that Babrius was a Roman, has
n the question, but some German scholars are
in investigating the subject. Boissonade has
l commentary and a Latin translation: the
ου Μυθίαμβοι. 'Babrii Fabulæ Iambicae
c primum editæ. J. F. Boissonade recensuit,
t, annotavit,' Paris, 1844, 8vo.
useum, part vi. p. 412, &c.)

IA (Βαβυλωνία), the territory so named from
bylon on the Euphrates. [Babylon, P. C.]
red by the antient geographers as a part of
., No. 21.

Assyria: but its boundaries cannot be fixed. The physical character of the Babylonian Plain is described in the articles Bagdad (Pashalic) and Tigris, P. C.

BACHELOR, an unmarried man. The legislation of the Romans placed unmarried persons (caelibes) under certain disabilities, the chief of which were contained in the Lex Julia et Papia Poppæa. The original Lex was simply called Julia, and was passed B.C. 18. (Dion Cassius, liv. 16.) The Lex Papia et Poppæa, which was intended as an amendment and supplement to the Lex Julia, was passed A.D. 9; and both these leges seem to have been considered as one, and they are often referred to under the title of the Lex Julia et Papia Poppæa. One object of the Lex was to encourage marriage. An unmarried person (caelebs), who was in other respects qualified to take a legacy, was incapacitated by this Lex, unless he or she married within one hundred days. (Ulpian, *Frag.* xvii. 1.) The law was the same if the whole property (hereditas) was left to a caelebs. (Gaius, ii. 111, 144, 286.) It was the opinion of the lawyers, that though a caelebs could not take directly under a testament, a caelebs could take by way of fidei commissum, or trust: but the Senatus-consultum Pegasianum, which was passed in the time of Vespasian, rendered a caelebs equally incapable of taking anything by way of fidei commissum. (Gaius, ii. 286.) A testamentary gift, which failed to take effect because the heres or legatee was a caelebs, was called Caducum (and the word was applied to other cases also), 'something which failed or dropped.' In the first instance, such a gift came to those among the heredes who had children; and if the heredes had no children, it came to those of the legatees who had children. If there were no such claimants, the Caducum came to the public treasury (aerarium). But by a constitution of the emperor Antoninus Caracalla, the Caducum came to the Fiscus, or Imperial treasury, instead of the public treasury; the rights of children and parents, however, were reserved. (Ulpian, *Frag.* xvii.) An unmarried man who had attained the age of sixty, and an unmarried woman who had attained the age of fifty, were not subjected to the penalties of the Lex Julia et Papia Poppæa as to celibacy, but a Senatus-consultum Pernicianum (Persicianum), passed in the time of Tiberius, extended the penalties to unmarried persons of both sexes who were above sixty and fifty years old respectively, and it made them for ever subject to the incapacities. However, a Senatus-consultum Claudianum, passed in the time of Claudius, mitigated the severity of the Pernicianum, in case a man married above the age of sixty, provided he married a woman under fifty, for the Roman law considered a woman under fifty as still capable of procreation. (Ulpian, *Frag.* xvi.; Suetonius, *Claudius*, c. 23.)

The Lex Julia et Papia Poppæa also imposed incapacities on *orbi*, that is, married persons who had no children from the age of twenty-five to sixty for a man, and twenty to fifty for a woman. Childless persons who came within the terms of the Lex lost one-half of any hereditas or legacy; and what they could not take became Caducum. The Lex also gave direct advantages to persons who had children. The original object of this Roman law was perhaps only to encourage marriage, but it was afterwards used as a means of raising revenue.

In the preceding exposition of the Lex Julia et Papia Poppæa, it has been assumed that the provisions above enumerated applied both to males and females. The word *caelebs*, indeed, seems to be applied only to males, and the Latin term for an unmarried woman is *Vidua*, which means any woman who has not a husband. But the expression of Ulpian (*Frag.* xvi. 3), 'Qui intra sexagesimum vel quae intra quinquagesimum annum neutri legi (the Julia, or Papia Poppæa) paruerit,' &c., shows that the provisions applied both to males and females. The word caelebs would not be used in the enactments of the Lex, but the phrase would be 'Qui Quaeve,' &c. That the Lex applied to women also, appears from other evidence. (Cod. viii. tit. 57.) Under the republic there were also penalties on celibacy, and legal inducements to marriage, which are mentioned in the speech which Dion Cassius (lvi. 57) puts into the mouth of Augustus. Julius Caesar, in the division of the Campanian lands, gave allotments only to those who had three children or more. (Dion Cass. xxxviii. 7; Appian, *Bell. Civil.* ii. 10.) The censors also are said to have had the power of imposing a penalty called Aes Uxorium, 'wife-money,' on men who were unmarried. (Festus v. 'Uxorium.') It was always a part of the Roman policy to encourage the procreation of children; the object of the English law imposing extraordinary payments on bachelors, and relieving to a certain extent married persons with children, was apparently to raise money, though a certain vague notion that marriage should be encouraged seems also to have occurred to the law-maker. A constitution of Constantine (*Cod.* viii. tit. 58) relieved both unmarried men and women from the penalties imposed on caelibes and orbi, and placed them on the same footing as married persons. This change was made to favour the Christians, many of whom abstained from marriage from religious motives.

Not only bachelors, but widowers have been unequally taxed in this country, and there is more than one instance, within the last sixty years, in which persons have been favoured by special exemptions, or have been charged less on account of the number of their children. In 1695 an act was passed (6 & 7 Will. III. c. 6) entitled 'An Act for granting to his Majesty certain rates and duties upon marriages, births, and burials, and upon bachelors and widowers, for the term of five years, for carrying on the war against France with vigour.' Bachelors above the age of twenty-five, and widowers without children, paid 1*s.* yearly, and further according to their rank. Thus, for a bachelor duke the tax was 12*l.*, and other ranks in proportion. An esquire was charged 35*s.* a year, and a person of the rank of gentleman 5*s.* Persons possessed of real estate of 50*l.* a year, or personal property of 500*l.* value paid 5*s.* A supplementary act was passed two or three years afterwards (9 Will. III. c. 32), to prevent frauds in the collection of the taxes imposed by the former act, but the tax was allowed to expire in 1706. In 1785, when Mr. Pitt proposed a tax on female servants, he exempted persons who kept only one servant, and who had two or more lawful children or grandchildren under the age of 14 living in the house with them. But to make up for the deficiency, he proposed that the tax on servants should be higher for bachelors than for others; and he stated that the idea of this tax was borrowed from Mr. Fox. This differential rate has been continued to the present time, and the number of servants charged at the higher rate in 1842 was 11,831, or rather more than one-tenth of the whole number charged. Roman Catholic clergymen are exempt from additional duty. When the income-tax was imposed by Mr. Pitt, in 1798, deductions were allowed on account of children, and an abatement was made of 5 per cent. to a person with children, when the income was above 60*l.* and under 400*l.*; and other rates of abatement were allowed according to the amount of income and the number of children: this indulgence extended to incomes of 5000*l.* a year and upwards.

There does not appear to be a tax on bachelors in any country in Europe. In the city of Frankfort an income-tax is paid by journeymen who work in the city, 'if they are foreigners, and not married.'

BACILLA'RIA, a large family of Infusorial animalcula, constituted by Ehrenberg, who includes in it upwards of thirty genera. The siliceous shields of these animalcula are amongst the most numerous of the forms of Microzoaria in the cretaceous, tertiary, and superficial deposits. Xanthidia occur in the chalk and its included nodules of flint: Gaillonellæ, Naviculæ, Actinocycli, Coscinodisci, Gomphonemæ, and other genera, abound in the white tertiary marls of Greece, Italy, Bohemia, England, and North America. The siliceous beds of Bohemia (Polïerschiefer), which are fourteen feet in thickness, contain innumerable shields of Naviculæ, and probably few of the superficial lacustrine deposits of Europe are wholly devoid of these exuviæ. [INFUSORIA, FOSSIL, P.C.S.]

BACIOCCHI, MARIE ANNE ELISA BONAPARTE, the eldest of the sisters of Napoleon, born at Ajaccio in Corsica, in 1777, received her early education in the Royal School of St. Cyr, near Paris. When that institution was suppressed by the National Convention, in 1792, Marie Anne Bonaparte returned to Corsica, from whence she emigrated with her mother and sisters to Marseille, the English having occupied her native island. At Marseille she married, in 1797, her countryman Captain Baciocchi, a retired officer of the former Royal Corsican regiment. In the following year she removed to Paris, where her brother Lucien was a member of the Council of the Five Hundred, and she undertook to do the honours of his saloon, where she became acquainted with several literary and scientific men, with whom she loved to wrangle upon all sorts of topics. She rose in rank and station with the rest of her family, in consequence of her
brother Napoleon's elevation to supreme po
assumption of the imperial crown, Napoleon
and his wife Princes of Piombino, and soon
On that occasion Marie Anne assumed the
name of 'Elisa,' 'Princess of Lucca and Piom
the principality of Massa and Carrara was a
minions, we say *her* dominions, because it is n
was the ruler, her husband having no share in
tion. Elisa's administration was upon the
to Lucca, where she fixed her residence.
Napoleon by a decree appointed the Princ
Grand Duchess of Tuscany, and to administ
the three departments into which that coun
as a part of the French empire. Her husba
named in the imperial decree. In consequen
appointment, the Princess Elisa removed to
she kept her court until the downfall of Napo
by no means as popular at Florence as she was
difference may be partly accounted for by the
latter country she was her own mistress, whilst
was a mere lieutenant of her imperious broth
was obliged to enforce all his obnoxious me
scription, the burthensome taxation, the rigo
But it seems also as if her removal to a larg
ministration had rendered Elisa's character m
harsh. She became very fond of military p
In 1814, when the allied armies advanced int
left Florence without any marks of sympath
the population, and after some wanderings,
the following year to Heimburg, near Vienna,
Caroline Murat had taken up her residence.
wards she removed to Bologna in the Papal S
went by the name of Countess of Campugnan
Bologna, of a nervous fever, in August, 1820.
and a daughter. The son, Frederic Baciocchi,
1833, of a fall from his horse. The daughter
Camerata of the Papal States. The father, F
purchased the splendid palace Ranuzzi at B
title of a Roman prince, and died there in 184

(Lesur, *Annuaire Historique*; Duchesse d'
de Paris; *Supplement* to the *Biographie Un*

BACTRIAN COINS. After the death
Bactria remained for fifty years a province
which it was united by Seleucus Nicator, be
and 301. When Seleucus became king of
became a dependency of the great Syrian
Seleucidae. During the reign of Antiochus T
247) Bactria was constituted an independent
governor Theodotus or Diodotus, who was a
and it continued so under his successors for s
The history of the Bactrian kings of Greek
given by any of the extant Greek or Roman
may have been noticed in Arrian's lost hist
cessors of Alexander. A few names me
antient historians, or discovered on some
the fact related by the Chinese annalists t
kingdom was overthrown by the Scythians,
of it. In spite of the barrenness of materi
Bayer undertook to write his 'Historia Re
Bactriani,' Petersburg, 1738, a book more v
the author says on things connected with
information on Bactria itself. Bactrian c
so rare, that the discovery of two gold co
end of the past century created a great sensa
and the acquisition of the names of two kings
a valuable addition to our knowledge of B
Nobody expected that Bactrian coins would b
quantities as to be sold by the measure and
than their intrinsic value. This is actually
some places in India and Afghanistan, though
copper coins. In the beginning of this centu
lonel Tod made a collection of coins during his
in India, of which several are of high interest
of Bactria. A description of them was given
in the first volume of the Transactions of the
Society, 1824. Two of these coins bore the
lodotus and of Menander, both Bactrian kings
rical value, says Wilson, is undiminished,
calculated to exhibit the rapid progress of
covery in respect to Bactrian coins more stri
diminution of their value as objects of rarity
twelve years. Instead of only two medals,
Paris and London now possess nearly two

nander and Apollodotus, of silver and copper, of
ety of types, and mostly in excellent preservation.
y on both sides of the Indus and north of the
sh having been explored with a view of search-
s, great discoveries were made. Generals Ventura,
Court, Dr. Swiney, James Prinsep, Sir Alexander
asson, and many others, mostly British residents in
e made collections of Bactrian coins, which enabled
out a complete series of Bactrian kings, of Greek
ic descent.

he term Bactrian coins are understood in this article
edals as were struck by kings of either Greek or
scent who ruled over the antient kingdom of Bac-
ts of it; but not coins of Hindu, Afghan, or foreign
dan princes who reigned at Kabool and other places
istan. The Greek coins may be divided, with re-
r inscriptions, into pure Greek and bilingual coins.
ass comprehends the names of five kings, Theo-
heodotus II., Euthydemus, Demetrius, and Eucra-
ascended the throne in B.C. 181, and perhaps
ong as B.C. 155. Of Theodotus I. two coins are
ne, a gold medal, was bought at the fair of Nishni-
Russia, and is now in the Royal Cabinet of Paris.
ds in weight and style with the gold coins of
I., and the portrait bears so close a resemblance
ntiochus, that it is supposed the artist copied the
prince. The obverse has the head of Theodotus.
has a naked figure of Jupiter erect, with his back
tor, and turned to the left; he is in the act of
hunderbolt from his right arm raised, whilst his
nded bears the aegis: on one side, in the field of
crown, and at the foot of the figure an eagle.
on each margin of the reverse is ΒΑΣΙΛΕΩΣ
erfectly distinct. The second coin is a silver
presented by Sir Alexander Burnes to the Bri-
, where there are also many coins belonging to
eek kings of Bactria. The bilingual class begins
es, who reigned about B.C. 147, but bilingual in-
e also found on the square copper coins of his
Eucratides. The two languages are Greek and
Hindu dialect written with particular characters
Arian or Arianian alphabet. The oldest bilin-
e all square, the barbaric inscriptions having been
ther with the barbaric shape, but the later coins
re and round. Fourteen kings with Greek names
to this class, the last of whom is Pantaleon, who
t B.C. 120. The Greek letters on these coins are
the design is generally good, on some very fine,
done by Greek artists; but there are also many
barbaric execution, and in the whole the appear-
tern emblems of royalty, and different Indian
other figures, betrays the decline of Greek civi-
mong the animals, the elephant and the elephant's
we find on the coins of Demetrius, Menander,
Lycias, and Heliocles, and the humped bull on
Philoxenus, Diomedes, and several other kings,
to indicate dominion in India. The wild horse
the double-humped camel are believed to have
erence to Bactria. Barbaric dynasties reigned
from the end of the second century before Christ.
ruck by them are bilingual, and betray the de-
d prevalence of Eastern influence. To this class
oins of several kings of the Arsacidan dynasty,
nes, Undopherres, Abagasus, and others, who
e been independent of the Arsacidae in Par-
coins are rare, and they are bilingual.

Bactrian gold coins are known, one of Diodotus
Euthydemus: all the others we know of are of
on, or of copper.

the beginning of our æra parts of Bactria were
princes of Scythian (probably Turkish) descent,
were at Kabool and Jellalabád, and who were
ed by the Arabs. The coins of these Scythic
xclusively of gold and silver, and bilingual—a
eek civilization, although on its decline, had still
e upon the people, as was the case in Parthia
sacidae. There are also many Sassanian coins
hanistan; a fact by no means extraordinary, as
the Sassanians in Persia extended occasionally
Indus, so that those Scythian kings were not
endent, but paid tribute to the Persians. The
kardo, in the upper valley of the Indus, pre-
scended from Alexander. As the Greek power in Bactria was maintained in some parts of the Hindu Koosh after the Scythian conquest, the principality of Iskardo may be a remnant of the Bactro-Greek empire, and a closer investigation into the history of Iskardo and the whole upper valley of the Indus would perhaps lead to interesting results.

The obscurity prevailing in the history and chronology of Bactria has of course an influence upon Bactrian numismatics, and one cannot be surprised at seeing the principal writers on these subjects at variance on most essential points. [AFGHANISTAN, P. C. S.]

(Wilson, *Ariana Antiqua*; Lassen, *Zur Geschichte der Griechischen und Indo-Skythischen Könige in Bactrien*, &c.; Grotefend, *Die Münzen der Griechischen, Parthischen, und Indo-Shythischen Könige von Bactrien*, &c.; H. T. Prinsep, *Note on the Historical Results deducible from recent Discoveries in Afghanistan*.)

BADALO'CCHIO, SISTO, an Italian painter and engraver, born at Parma towards the close of the sixteenth century. He was the pupil and for some time the assistant of Annibal Carracci at Rome. He was highly valued by Annibal as a draughtsman, who confessed that he surpassed himself; but in painting he was much inferior to Guido or Domenichino. His engravings are not numerous: the most celebrated are the so-called Bible of Raphael, which he executed in company with Lanfranc, and dedicated to Annibal Carracci; and the six prints from Correggio's cupola at Parma. Of his paintings the best was Galatea, in the Verospi palace at Rome; a San Francesco at the Capucins of Parma, was also one of his best works; but like his friend Lanfranc, says Lanzi, he always did less than he was capable of doing. The date of his death is not known.

(Lanzi, *Storia Pittorica*, &c.; Malvasia, *Felsina Pittrice*; Bartsch, *Le Peintre-Graveur*.)

BAGGESEN, JENS, a writer of considerable distinction both in Danish and German literature, was born at Corsoer in the island of Zealand, February 15, 1764, and was educated at the University of Copenhagen. From his earliest youth he displayed unusual liveliness of imagination, of which, together with satiric humour, his first production, at the age of twenty, his 'Comic Tales,' gave evidence, and obtained a most favourable reception from the public. Yet he himself says that he had no taste for the comic; that in writing his tales he consulted that of the public far more than his own, and that he published them for the purpose of paying off his father's debts and assisting the family: from which it would appear that they were left in embarrassed circumstance. Still he seems to have been for some time afterwards without fixed pursuit of any kind, except that of writing some of his smaller poetical compositions and the opera of 'Holger Danske.' He had however acquired the favour of the Prince of Holstein-Augustenborg, who bestowed on him a small pension. In 1789 he visited Pyrmont in hope of benefiting from the waters, and meeting there with his countryman the young Count Moltke, who was also an invalid, he accompanied him to Switzerland, and returned home through France and Germany. Of this journey he has given a full narrative, or rather picture, in his 'Labyrinthen,' one of the most interesting of his works, it being, as he himself calls it, his 'Digtervandringer,' or 'Wanderings of a Poet,' in which he records his varied feelings, opinions, and contemplations, and portrays his own character. For that period of his life to which it refers, it may in fact be considered a piece of autobiography, and it certainly enters at some length into one rather important circumstance of his personal history—his acquaintance with Sophia Haller, the granddaughter of the poet, whom he married at Berne, in March, 1790, after which event he immediately returned to Denmark. Notwithstanding his poetical attachment to his native land, he did not remain there long: he fancied it a sphere too contracted for him, felt unsettled and unable to apply to anything seriously, so set out again for Germany, taking with him his wife, for the purpose of leaving her with her family at Berne. He then visited Paris, being at that time an ardent enthusiast for the French Revolution, and there he became acquainted with many of the public characters of the day. On his second return to Copenhagen, in 1796, he obtained a professorship at the university, but found it too irksome for his disposition, and as change of climate was thought necessary for his wife's health, he set out the following year for Germany, but lost his wife at Kiel. Instead of returning, he proceeded to Switzerland, taking with him his two young children; and in 1798 again visited Paris, where he married Fanny Reibaz. This planless mode of life and constant change of place did not contribute to better his circumstances: he first got into debt, and then into prison. It was during his stay in France, which was prolonged till 1810, that he composed his chief German poems; among others the 'Parthenais, oder Alpenreise,' an epic idyll, in twelve cantos, after the manner of Voss's 'Luise,' and, like that, written in hexameters. On its first appearance (1806) that production was received most favourably, as one that entitled its author to very high rank among the poets of Germany; but criticism has since spoken of it in a more sober tone. His long residence at Paris terminated by his being glad to accept the appointment of professor of Danish literature at the University of Kiel. Even that he did not retain very long, but returned in 1814 once more to Copenhagen, where he was most warmly received, yet soon embroiled himself in a violent feud with Oehlenschlager, whom he opposed as the leader of the romantic party in poetry. This led him to make Paris once more his place of residence, with occasional visits however to Copenhagen. On his health beginning to decline, he went, in 1825, to Carlsbad for the benefit of the waters, and was returning thence to Copenhagen, when he died at Hamburg, October 3, 1826. After his death, but in the same year, appeared his 'Adam and Eve,' a most extraordinary subject for a 'humourous epic;' not less so for being chosen by one who had told the public that he had naturally no relish for the comic strain, in which he nevertheless indulged when on the verge of the grave. The warm-heartedness and enthusiasm of his youth must have been exchanged for a very different temper of mind before he could have brought himself even to the contemplation of such treatment of such a subject, and his rapturous admiration of Klopstock must have evaporated altogether. He is said to have left in manuscript a poem of similar and even stronger character, of which Faust was the hero. His correspondence with Reinhold and Jacobi, in two volumes 8vo., was published by his sons in 1831; and a complete edition, in twelve volumes, of his 'Danske Værker,' comprising all his Danish poems and other writings in that language, his translation of Holberg's 'Niels Klim' inclusive, was published by his sons and C. J. Boye, 1827-32. A well-executed portrait of him is prefixed to it.

BAGLIO'NE, GIOVANNI, a Roman fresco and oil painter of the seventeenth century, at present better known for his 'Lives' of his contemporaries than for his paintings, though in his time he enjoyed the highest patronage. He was born at Rome about 1573, and was for a short time the pupil of a Florentine painter, Francesco Morelli. He attracted the notice of the popes Sixtus V. and Paul V., the latter of whom created Baglione a Cavaliere del Abito di Cristo. In 1618 he was elected Principe of the Academy of St. Luke. The date of his death is not known; he was still living in 1642. He executed a great many works in Rome, some at Naples, and some at Mantua; but he painted very few easel pictures, whence his works are rarely seen in collections; he excelled in colour, and in light and shade. One of his best works is the Resurrection of Tabitha, in St. Peter's at Rome.

His book of memoirs, of which he has written 81, is written in an extremely simple style, without the slightest attempt at criticism, and if he ever ventures upon a qualifying remark, it is sure to be one of commendation. G. B. Passari published an edition of it at Naples in 1733, with the addition of the Life of Salvator Rosa: there is also a memoir of Baglione, which contains a long list of his works. The following is the title of the book—'Le Vite de' Pittori, Scultori, Architetti, ed Intagliatori, dal Pontificato di Gregorio XIII. nel 1572 fino a' tempi di Papa Urbano VIII. nel 1642.' The editio princeps was published at Rome in 1642, and a second appeared in 1649, according to Orlandi.

BAGLIO'NI, an historical family of Perugia in Italy, which in the middle ages produced many distinguished warriors, several of whom exercised supreme power over their native town. Perugia was in those times one of the most populous and important cities of central Italy, and governed itself as a municipal community, under the nominal protection first of the Emperors and afterwards of the Popes. Like most other Italian cities, it was distracted by two parties, that of the nobles, and that of the people. The Baglioni belonged to the nobles. We find in the twelfth century Ludovico Baglioni appointed Imperial Vicar of Perugia, by the emperor Frederic I. (Barbarossa), who in his diploma styles him his relative, as being issued, like himself, from the Ducal House of Suabia. After the fall of the Suabian dynasty, the nobles and the popular party had frequent conflicts with alternate success. In the year 1393 a general outbreak
when Pandolfo and Pellino Baglioni, with seven
tlemen, were killed in fight in the streets, and th
being driven away, the popular party remained
of the town, until 1416, when Braccio Forteb
head of the nobles, re-entered the town by f
proclaimed Lord of Perugia. Malatesta Baglioni
dolfo, was one of the foremost followers of B
niece he married One of his sons, named Bra
was appointed General of the Holy See by Pope
he defeated Francesco Sforza near Lodi in 14
Lord of Spello by Sixtus IV., and died in 1474.
Ridolfo left a son called Gian Paolo Baglioni,
conspicuous in the Italian wars of the beginning o
century: Gian Paolo began his career as a c
captain of one of these mercenary bands which
vices for a time to any one of the Italian St
willing to pay for them, and he acquired a gre
for military skill as well as for personal brave
time he availed himself of the civil dissensions
town to obtain supreme power over it, and he
with Pandolfo Petrucci, who had likewise made
of Siena, and with Vitelli, Lord of Città di C
allied himself also with Cesare Borgia in his
Romagna, but when Borgia in 1502 waylaid and
Vitelli, Orsini, and others of his former allies,
glad to make his escape, and leave Perugia to
returned in 1503, after the death of Pope Al
but in 1506 he agreed to give up Perugia to Po
who followed up Borgia's plan of putting down
tyrants who had parcelled among themselves th
of the Papal state. Gian Paolo then resumed
fession of condottiere, and served the Venetian
years in the war of the league of Cambrai.
prisoner by the Spaniards in 1513, but being
returned to Perugia, where he resumed his forme
Some years after, Leo X., who had at first
usurpation, hearing repeated complaints of Baglio
requested him to come to Rome, under pretence
with him about weighty state matters, and sen
conduit. On his arrival at Rome, Baglioni
taken to the Castle St. Angelo, and there put t
being charged, among other things, with being
the conspiracy of Cardinal Petrucci discovered
before. He was speedily condemned and behe
happened in 1520. Perugia was then taken pos
the pope. After Leo's death, Malatesta and Or
the sons of Gian Paolo, recovered possession of
the assistance of the Duke of Urbino. Malatest
by the citizens as 'Pater Patriæ,' and a meda
in honour of him. Orazio afterwards obtained
of the mercenary corps called the 'black bands' i
of France, and followed Marshal Lautrec in h
against Naples in 1528, in which he was killed.
Malatesta remained at the head of the governme
till September, 1529, when he was obliged to su
the papal and imperial allied arms, and at the sam
chosen by the Florentines to be their Captain-G
the same enemies. The choice was unlucky. Ba
through incapacity or treachery, or both, di
Florence as he might; he entered into corresp
the besiegers; and lastly, in August, 1530, was d
his command. He refused however to give it
turned the guns of one of the ramparts agai
Florence, worn out by famine and disease, wa
capitulate and submit to the rule of the Medi
returned to Perugia, where he died in Decembe
left a son, Ridolfo, who became general of
Cosmo I., Grand Duke of Tuscany.

Gentile Baglioni, grandson of Braccio above m
made Bishop of Orvieto in 1505, but afterwar
quence of his three brothers dying without leg
he renounced his dignity, married Giulia Vit
for a time governor of Perugia for the pope.
away by his relative Orazio Baglioni, who cau
put to death in 1527, with two of his nep
various branches of the Baglioni family wer
enmity against one another. Gentile left tw
one, Adrian, served in the papal troops, and
and the other, Astorre Baglioni, is better know
for his military reputation and his tragical end.
brought up under the care of his uncle Alessan
distinguished general of his age, whom he fol

wars against the Turks. He afterwards served
in Italy and on the coast of Tunis; and he rose
favour of Pope Paul III., who restored to him his
ates. Lastly he entered into the service of the
Venice, which intrusted him with several import-
ns. He was governor of Famagosta in the island
when the Turks besieged the place in 1570. After
ave defence he was obliged to capitulate, in August,
ndition of being sent to Venice with his garrison.
pha Pasha, disregarding the capitulation, caused
d the other Venetian officers to be beheaded, ex-
dino, who was flayed alive by order of the Pasha.
other individuals of the family of Baglioni distin-
selves in the Italian wars of the fifteenth and six-
turies.

i, *Perugia Augusta*: Sansovino, *Della Origine e dei*
Famiglie Illustri d' Italia; Vermiglioli, *Vita e*
Militari di Malatesta Baglioni, Perugia, 1839;
Biografie dei Capitani Venturieri dell' Umbria,
mo, 1840.)

UT SAND. One of the higher members of the
ip of England is thus designated. It has been
by Mr. Warburton. (*Geol. Trans.*)

P. C., vol. iii. p. 287.] The general principles
of Bail remain unchanged. But as, since the
Vict. c. 110, § 2, all personal actions are to be
y writ of summons, the cases in which a defend-
ield to bail in civil causes are now confined to
ure specified in the third section of that statute.
enacted that if a plaintiff in any action in any of
courts of law at Westminster, in which the de-
r liable to arrest, shall show by affidavit to the
f a judge of one of the said courts that such
a cause of action against such defendant or
the amount of 20*l.* or upwards, or has sustained
at amount, and there is probable cause for be-
he defendant or any one or more of the defendants
t to quit England, unless he or they be forthwith
such judge may order the defendant or defend-
eld to bail in any sum he may think fit, not
e amount of the debt or damages. The plaintiff
n sue out a writ of capias, and arrest the defend-
en so arrested, is to remain in custody till he
ven a bail bond to the sheriff, or shall have made
e sum endorsed on such writ of capias, together
the costs, according to the present practice. All
eps of the proceeding are to be conducted ac-
he present forms. The power given by the
judge to grant an order to hold to bail, is not
he act of 7 & 8 Vict. c. 96 (Lord Brougham's

d to criminal law, the statute 7 Geo. IV. c. 64.
ewhat altered by the 5 & 6 Will. IV. c. 33.
ovides that any two justices of the peace, if they
t (of whom one or other shall have signed the
mmitment), may admit any person or persons
felony, or against whom any warrant of commit-
ay is signed, to bail, in such sums and with such
ey shall think fit; notwithstanding such person
all have confessed the matter laid to his or their
twithstanding such justices shall not think that
groundless, or shall think that the circumstances
raise a presumption of guilt.

, **ROBERT**, was born in Glasgow, April 30.
ather, Thomas Baillie, is described as a citizen
nd was a younger son of the family of Baillie of
small property near the town of Hamilton in
not to be confounded, as it has often been, with
Baillie of Jerviswood, in the same county, the
h, in the latter part of the seventeenth century.
ent Presbyterian patriot Robert Baillie, who.
imprisonment and many other sufferings, was
dinburgh in 1684). The subject of the present
ducated first at the grammar-school and after-
niversity of Glasgow, at which he was entered
March, 1617. He took his degree of M.A. in
ly in 1623 or 1624 he entered into holy orders:
25, he was admitted to the office of one of the
gents (as the professors were then styled) of the
this situation he held till the year 1631, when
ted by the Earl of Eglinton to the parish church
g in Ayrshire. At this time Baillie's sentiments
t of church government were extremely mode-
rate; his ordination had been episcopal, and he was attached on principle, as well as by education and habit, to that form of polity, which was indeed at this time the established ecclesiastical system in Scotland. But when Charles I. made his attempt in 1636 and 1637 to impose the new service-book and canons upon the Scottish church [Spotswood, John, P. C., p. 379], Baillie was induced to attend a meeting of the Supplicants, as the opponents of the obnoxious measures called themselves, which was held at Edinburgh on the 18th of October, 1637; and this proved the turning point of his life. He was probably far less zealous upon the subject of mere forms and ceremonies than any other person present; but he had studied the doctrinal controversies touching antinomianism and other points which then divided the English theologians; and, having been prevailed upon to explain the reasons upon which he confessed, although in mild terms, that he disapproved of the new service-book, he spoke at some length, and so delighted his audience by his citation and exposure of the opinions avowed by Laud and his party, the authors of the book, that he was urged to send the substance of his speech forthwith to the press, and from this time he took his place as one of the chief managers and leaders of the Presbyterian and anti-court party. When he first rose to speak at the Edinburgh meeting, it was, he tells us, 'with some piece of blushing, in such an auditory,' the like whereof he had never before addressed; but he adds that he was heard with very great applause, and ere evening was a famous man over all the town.

He still however retained something of his original moderation when he made his appearance, as one of the members for the presbytery of Irvine, at the celebrated General Assembly which met at Glasgow on the 21st of November, 1638; so much so, that he stood alone in refusing to concur in the vote declaring episcopacy to have been always abjured by the Scottish church: he proposed that it should be declared to be 'removed now, but never before abjured.' The prevailing party however were aware of his value, and he was soon entirely gained over. When arms were taken up, he appeared in the camp at Dunse Law, in the beginning of June, 1639, in quality of preacher to a division of the troops, and carrying, he tells us, as the fashion was, a sword, and a couple of Dutch pistols at his saddle—though he intended, he says, to fight no man unless he should encounter a robber by the way. A pacification was in fact arranged at Berwick (on the 15th of June) before any blood was shed.

In April, 1640, Baillie published what may be considered to have been an extension of his speech at the meeting of Supplicants, in a large quarto pamphlet at Edinburgh, under the title of 'Αὐτοκατάκρισις; The Canterburians' Self-conviction; or, An Evident Demonstration of the avowed Arminianism, Popery, and Tyranny of that faction, by their own confessions,' &c. In the following October, when the Scotch had again taken arms, he proceeded, on the invitation of the earls of Rothes, Montrose, and Argyle, to the council of war at Newcastle, taking with him a number of copies of his book; and here he was nominated one of the four clerical commissioners who were deputed, with nine laymen, to proceed to London, under the protection of the great seal, to negotiate a treaty with the king. He reached London on the 16th of November, and remained there till the beginning of June, 1641, having, during his residence, witnessed the trial of Strafford and other remarkable occurrences, of which his letters contain very detailed and graphic accounts. In one of his letters written during Strafford's trial, he writes, in a somewhat sanguine as well as sanguinary strain, 'When we get his head, then all things will run on smooth.' In June, 1642, Baillie was appointed joint Professor of Divinity in the University of Glasgow: but immediately after this he was again dispatched to England as one of the five clerical commissioners from the General Assembly to the Westminster Assembly of Divines. He reached London on the 18th of November; and his stay this time lasted for more than two years: he did not leave till the 6th of January, 1645. He was sent back again before the end of March, when, as he was proceeding by sea, the ship was driven towards the coast of Holland, and forced to run up the Maas, which gave Baillie an opportunity of spending a few days at Middelburg and Rotterdam. He remained in London on this his last visit till December, 1646, employing every moment that was not taken up in attending the Assembly of Divines in preaching and in writing sermons, pamphlets, and letters to his friends in Scotland and elsewhere. He now resumed his duties as Professor of Divinity—continuing also, however, to take an active part in public proceedings. After the execution of the king, he was one of two clergymen sent over to the Hague, in March, 1649, with the commissioners of the Scottish estates (or parliament) to enter into negotiations with Charles II. Upon this mission he was absent till July, and during that interval he composed and published at Delft an answer to a pamphlet against Presbyterianism by Bishop Bramhall, under the title of 'A Review of Doctor Bramble, late Bishop of Londonderry, his Fair Warning against the Scotch Discipline.' When Cromwell advanced upon Glasgow, in October, 1650, after the battle of Dunbar, Baillie fled to the isle of Cumray with Lady Montgomery, but left, he tells us, all his family and goods to Cromwell's courtesy, 'which,' he adds, 'indeed was great; for he took such a course with his soldiers that they did less displeasure at Glasgow, nor [than] if they had been at London, though Mr. Zachary Boyd railed on them all to their very face in the High Church.' Under the new government, he was, in January, 1651, appointed First Professor of Divinity on the removal of his colleague to a chair at Edinburgh; but he was after this greatly disquieted by the promotion to offices in the university of various persons who went much farther than he was disposed to go in compliance with the times. In church politics Baillie now allied himself with the more moderate party, or those who were called the Resolutioners (that is, the supporters of certain resolutions passed at an Assembly held at Perth, in December, 1650), in opposition to the minority, known as the Remonstrants or Protestors. One of his great vexations was the appointment of Patrick Gillespie, one of the leaders of the latter party, as Principal of the university in 1653; but immediately after the Restoration Gillespie was turned out, and Baillie himself was promoted to his office in January, 1661. He did not however long enjoy this preferment, having died about the end of August in the following year. He had been twice married, and had eight children, of whom only one was by his second wife.

Of Baillie's works the most important, besides those already mentioned, are his 'Dissuasive from the Errors of the Time,' 4to. Lond. 1645; his 'Anabaptism, the True Fountain of Independency, Brownism, Antinomy, Familism, &c.' (a Second Part of the Dissuasive), 4to. Lond. 1647; his 'Appendix Practica ad Joannis Buxtorfii Epitomen Grammaticae Hebraeae,' 8vo. Edin. 1653; and his 'Operis Historici et Chronologici Libri Duo,' folio, Amst. 1663, and Basil, 1669. He also published several sermons and other short tracts. But of all the produce of his pen by far the most interesting part consists of his Letters, written to various friends, and especially to his relation, the Rev. Mr. William Spang, minister of the Scottish church at Campvere, and afterwards of the English congregation at Middelburg in Zeeland, which extend, with inconsiderable interruptions, from 1637 to within a few months of the writer's death, and are to be ranked among the most valuable memorials of that important period of our national history. These letters were originally copied by an amanuensis under Baillie's own eye, and the transcript thus formed is now among the records of the Scottish church. Other transcripts, more or less perfect, also exist—the most valuable of which is one, in four vols. folio, made for the use of Baillie's family, and now in the possession of the Rev. Thomas M'Crie, of Edinburgh. An edition of them appeared at Edinburgh, in 1775, in 2 vols. 8vo., under the title of 'Letters and Journals written by the deceased Mr. Robert Baillie, Principal of the University of Glasgow; carefully transcribed by Robert Aiken' (supposed to have been schoolmaster at Anderston). This publication is said to have been undertaken on the recommendation of Dr. Robertson and Mr. Hume; but it is in fact only a selection from the letters, and is far from presenting a faithful text even of so much of them as it professes to give. The book besides had become excessively scarce and high-priced. Historical readers and inquirers therefore have gladly welcomed a complete edition of the Letters, which has been lately produced under the care of David Laing, Esq., in 3 vols. cr. 8vo., Edin. 1841-2, with annotations, a Life of Baillie (to which we have been indebted for the materials of this notice), and other illustrative matter. The book was originally printed in 4to. for the Bannatyne Club, and the 8vo. impression, for public sale, was afterwards taken off by over-running the lines. It is in all respects a very carefully edited book.

BAILY, FRANCIS, the best friend of astronomy among the Englishmen of his day, and one of the most distinguished of its promoters, will be biographically known to posterity by a valuable memoir, read by Sir John Herschel to the Astronomical Society, in November, 1844. From thi
the writer's personal knowledge of Mr. Baily,
account is drawn up.

He was born April 28, 1774, at Newbury i
his father was a banker at that place. He had
liberal education, and is said to have shown
pursuits of physical science at an early age; h
to these branches of knowledge was afterwards
an intimate acquaintance with Priestley. But a l
was his own choice, and he accordingly served h
city of London. He then changed his view
travelling for about two years (1795-96) in the
of America, and then residing some time at New
father, he went into business as a stockbroker, be
partnership by his father's friend, Mr. Whitm
before 1802, and probably not long after his retu
rica. He soon began to be known to the public,
eminent in his business as afterwards in his scien
In 1806 he wrote a pamphlet in defence of the
against the city of London, and in 1814, he w
by the Committee of the Stock Exchange to
evidence against the perpetrators of the celebr
De Berenger (better known in connexion with
Lord Cochrane), which he is said to have done
a manner that no more complete chain of evid
offered to a court of justice. He published t
the subject, and another on the distribution
stopped.

It is the peculiar part of Mr. Baily's histor
actively engaged in business, in which he accum
fortune, he gained a first-rate reputation in o
mathematical application, and laid the foundati
to be completed after his retirement from the Sto
at the age of fifty-one. He had a good worki
of mathematics, in all the elementary branches,
sive acquaintance with English writers on the
first published his 'Tables for the purchasing
of Leases' (1802, 1807, 1812, 8vo.); next 'Th
Interest and Annuities,' (1808, 4to.); then 'T
Life Annuities and Assurances (1810, 8vo.);
pendix to the doctrine of Life Annuities and
(1813, 8vo.). Also, 'An Account of the
Assurance Companies' (1810, 1811, 8vo.),
extract from the work on life assurance.
leases was very useful; that on interest was
by a reprint of the best tables (those of Sm
the most complete exposition of the subjec
been given. The work on life annuities (tr
French by M. de Courcy in 1836) is still much
and was exceedingly useful; it was the first in
was systematically applied in a modern and sym
to the whole of the subject; the first in wh
greater vitality were allowed to compete with
ampton Table; and the first in which an att
complete as the subsequent one of Mr. Milne)
represent cases of annuities, &c. by a distinct n
appendix arose out of the refusal of the Royal S
in the Philosophical Transactions the method
annuities proposed by Mr. Barrett. [REVERS
This method, which is now very extensively adop
beyond a doubt, supersede all others, would
been lost if Mr. Baily had not thus preserved a
the world; in doing which he made some justly s
on the Society which had thus endangered a ca
ment in commercial mathematics. The whole wo
for four and five times its original price when it bec
hand book; and if the writer had published n
writings already enumerated, he might still have
a remarkable instance of active and useful exerti
hours of relaxation from a laborious occupation.

It was Mr. Baily's habit so methodically
writing all he learnt, that his notes enabled hi
the 'Epitome of Universal History,' 2 vols. 8vo.
account of the political changes of the worl
attached, and valuable chronological tables at
had previously (1812) published his 'Chart of
an explanation; an extension of Priestley's Ch
cannot here minutely describe. In these rese
marked the unsettled date of the eclipse of Thal
the calculations and wrote the paper in the
Transactions described in ALYATTES, P. C.
first astronomical paper, and previously to his re
business he had published in the Philosophical

umber of small tracts calling attention to dif-
f astronomical interest as they arose.

from business in 1825, and shortly afterwards
rs in Gray's Inn for a detached house which
, No. 37, Tavistock Place, which will always be
the building in which the repetition of the
periment was performed. From this time till
was engaged with all the energy of his character
on of astronomy. Between the ages of fifty-
nty, when most men in his circumstances would
joying the leisure to which commercial men
rs are apt to look forward, he did the work
We can here only note a few heads, referring
a full list of his writings, and for further details,
already cited.

1820) one of the founders of the Astronomical
y which has done as much for the promotion of
ny one ever did in its first quarter of a century;
ch can be said is mainly due to Mr. Baily, whose
affairs was as constant and minute as if it had
which he was the chief clerk, with expectation
into partnership. 'Of his management of our
Ir. Sheepshanks, 'it is difficult to speak so as to
ct idea. No assumption, no interference with
o martinet spirit (which seems almost natural to
s men), but everything carried on smoothly and
without bustle. He hit, better than any chair-
er seen, the mean between strictness and laxity,
ept everything going in its proper channel, he
body in good humour. This natural tact was
ut there was another quality which I never saw
him, and that was his readiness to give pre-
oom to every one who wished to do anything
equal readiness to supply every deficiency
ork of everybody else. He was also the person
asleep and never forgot anything, and who
is good humour, hospitality, and good sense, to
g in train.'

of those who exerted themselves to produce a
d enlargement of the Nautical Almanac, and
id at last prevail upon the government to place
ent distinguished footing.

m experiments [PENDULUM, P. C.] he was
emost of those who investigated the newly
of the air upon the instrument. When the
ch set out under Captain Foster returned with
ble commander, Mr. Baily reduced and digested
s, which take up the whole of the seventh
Astronomical Society's Memoirs.

nded the formation of the same society's standard
e a full and valuable account (*Mem. Astron.*
f the history and present state of the subject,
the experiments. These were carried on in
om of the House of Commons, the government
that of the society is a copy, being under the
Speaker. As it happened, Mr. Baily's unre-
of business were the cause of the preservation
had the work lasted a few months more, as it
ne in most hands, the copy would have been
the original in the fire at the Houses of Par-
.

tition of the Cavendish experiment we have
ere. [WEIGHT OF THE EARTH, P. C.] Had
t been written during his lifetime, we should
more on the determined honesty with which
s were carried on until the cause of the observed
as detected. A very large number of hours,
every reason to suppose underrated when it is
ndred, was spent in the mere act of watching
of the torsion pendulum. The account of this
s volume xiv. of the Memoirs of the Astrono-

omical Society's catalogue of stars was the sug-
. Baily and Mr. Gompertz, and was superin-
. Baily. Up to that time there had been no
t as to the method of reducing the stars. Sir
says that this catalogue 'put the astronomical
ession of a power which may be said with-
on to have changed the face of sidereal astro-

rkable circumstances attending the publication
Life of Flamsteed (4to., 1835, with supplement
have spoken elsewhere. [FLAMSTEED, P. C.]
To this work was annexed a new edition of Flamsteed's catalogue, with such a complete examination of the original observations as make it quite a new work. None but those who knew Mr. Baily well can have any idea of the confidence with which such an examination made by him is to be treated. He had already revised Mayer's and Lacaille's catalogues in the Astronomical Society's memoirs, volumes iv. and v.

He put the finishing hand to his revision of antient catalogues in the 13th volume of the Memoirs of the Astronomical Society, which is entirely his own work, and printed at his own expense. It is the third complete *volume* (independently of the catalogue) which he contributed to these Transactions, with about fifteen memoirs inserted in other volumes, almost all the annual reports, and various addresses, notices, &c. It contains a new edition of Ptolemy's catalogue in Greek, with those of Ulugh Beigh, Tycho Brahé, Halley, and Hevelius. Mr. Baily was not a professed scholar, but he had quite knowledge enough to do for Ptolemy more than any scholar could have done. An astronomer might have restored Ptolemy's catalogue to what it ought to have been; a scholar might have made a judicious collation of existing editions: but the former alone would in many cases have undesignedly sacrificed the probable text to astronomical correctness; and the latter would have let pass many instances in which a corrupt text can be divested of astronomical impossibility and restored with the highest probability. Mr. Baily had every requisite, and experience, combined with methodical habit, had given him extraordinary resources. It will be long, we suspect, before the old catalogues can be properly cited from any other writer.

He suggested to the British Association the republication of the immense catalogue of Lalande, called the *Histoire Céleste*, combined with that of Lacaille; the two together containing fifty-seven thousand stars. He suggested to the same body the extension of the Astronomical Society's catalogue to ten thousand stars, accompanied by the coefficients of reduction. He superintended the construction of these tables and a portion of the printing, and he left the preface to the latter completely written. He had also undertaken the construction of the new standard scale, wanted by the government in consequence of the destruction of the old one.

This is a brief account of Mr. Baily's principal works; we cannot enter upon every one of the ninety heads under which all his writings, great and small, are given in the Memoir cited.

In June, 1841, while crossing Wellington Street, a man riding furiously to carry the news of some public event to an evening paper, threw him down, and he received a severe wound in the head. After lying for more than a fortnight in the greatest danger, he slowly recovered, and began to apply himself to the Cavendish experiment as usual. In the spring of 1844 an affection of the kidneys came on (not, it is supposed, to be traced to the accident), of which he died, August 30, 1844. His last public appearance was at Oxford, on the 2nd of July, to which place he went with some difficulty to receive the honorary degree of Doctor of Civil Law. He was never married.

'To term Mr. Baily,' says Sir John Herschel, 'a man of brilliant genius or great invention, would in effect be doing him wrong. His talents *were* great, but rather solid and sober than brilliant, and such as seized their subject rather with a tenacious grasp than with a sudden pounce.' This sentence, read as it was to an assembly which had had long experience of the qualities of its subject, was better understood than it can be by those who were not acquainted with him. He was in fact one of the most remarkable men we ever knew; and yet it is not easy to give a precise description of that which distinguished him from other men. Again, his biographer describes him as possessing 'a calm the reverse of apathy, a moderation having nothing in common with indifference, a method diametrically opposed to routine.' This sentence will look as if it had been written for the sake of the points; and yet there is an absolute truth about it which would have been sacrificed if it had simply been said that Mr. Baily was calm, moderate, and methodical. When the memoir which we have cited had been read, its hearers, well as they thought they had known their deceased president, were astonished to find how much they had underrated the enormous amount and collective value of his labours, until the mass was placed before them: they could vouch for the items, but had never rightly formed the sum total.

Mr. Baily's knowledge of his subject was great, and he never began to carry a plan into execution until he had sedulously examined his own views and those of others. His judgment was sound, and he really exercised it; he was one of the few men who ask advice to get the means of coming to a decision. But there was in his habits of execution something unique: to us it seems right to say that in this respect he was a genius of an uncommon order. Many persons thought he learnt this power in business: we are perfectly satisfied that he carried it to the Stock Exchange, and would have had it whatever walk of life he might have been thrown into. There was nothing like a retired accountant in his proceedings: instinct seemed to point out to him the proper mode of undertaking things to which he had never been accustomed. In a few days he could digest his plan, and begin to work upon its separate parts. Even when engaged in research such as that required by his Life of Flamsteed, he was never to be found at a table loaded with materials for reference. To have painted his picture as literary men are sometimes represented, near a mass of folios and manuscripts, would have spoiled the likeness: there should have been a pen, a paper, a book. When engaged in discussion with his astronomical friends in his own house, which generally required the production of some fresh volume every ten minutes, the books fell into their places again almost of their own accord, and without any apparent interruption of the conversation. These little things were perfect emblems of the manner in which he arranged his studies: his mind was as ready for use as his bookcase. He was not distinguished, as far as we ever knew, for powerful memory, he never refused a visit on the plea of occupation, he seldom worked in an evening, and he was very much in society. Nevertheless his share of any work was always done before that of any one else. But with all this rapidity, the moment that any difficulty arose which required counsel, there was a suspension of operations without effort; and he could repeat the subject again and again, in private thought and discussion with his friends, from week to week and from month to month, as if he had been one of those slow and deliberative persons who never do anything because they can never make up their minds precisely how it is to be done. In our opinion this was the greatest secret of his reputation: namely, that he could at pleasure, as occasion required, execute with impetuous zeal, or deliberate with more than coldness. It is no exaggeration to say that he did, in the last twenty years of his life, much more and better work than younger men of much greater original power have done in twice the time. And besides this, the admirable personal qualities to which we have already alluded, and which made it so easy to co-operate with him, led to his being able to make others do more than they could have done without him. His high moral worth added to his power; and all these together made him the most influential member of the astronomical world. He had, we suspect, a strong love of fame, though perfectly free from vanity; but the same judgment which marked his selection of other things appeared in his choice of means to secure a lasting reputation. That he has won it is certain: the history of the astronomy of the nineteenth century will be incomplete without an account of his labours. Those who are well acquainted with Delambre's history of the science will easily imagine how much that severe judge would have abated of his rigour, had there came before him such models of patient thought, all but impeccable accuracy, careful research, and well-chosen objects, as the writings of Francis Baily.

BALA LIMESTONE, one of the most interesting of the calcareous deposits which have been examined by Professor Sedgwick in the midst of the schistose rocks of North Wales. There are two bands of this rock, exhibited on the west of the Berwyn mountains and on the east of Bala Lake. Two miles north-east of Bala, the limestone, and the schistose rocks in which it lies, may be well seen, and numerous fossils may be gathered at this and at many other points in the vicinity of Bala, on both sides of the lake. Professor Sedgwick has satisfied geologists of the true position of these rocks with reference to the slates of the Berwyn range, and the flags and slates of Llangollen. The series is in two parts, thus:—

Upper Part. Flags and schistose beds of Llangollen, with upper Silurian fossils.

Lower Part. Schistose beds with *limestone bands*, the lowest of which occur at Bala, and yield lower Silurian fossils.

This is the view of Professor Sedgwick, and we have had, through his guidance, personal opportunity of proving its truth. The Bala and Llandeilo limestones are thus nearly coeval.

BALDI'NI, BA'CCIO, a Florentine goldsmith, and one of the first Italian engravers, whose works on that have an historical interest, but are otherwise of a ver scale of merit. As is the case with the majority artists of that period, little or nothing is known He appears to have been active from about 1460, 1481; he was bred a goldsmith, and was taught engra Finiguerra himself, who was the inventor of the art to the Italians. Baldini however, though acquainted art, could derive no benefit from it, as he was inca making a design; he communicated it therefore to A Botticelli, and the two entered into partnership; the signed and the other engraved. Such is the story The first prints published in Italy are those of the titled 'Il Monte Santo di Dio,' and of an edition with the commentary of Landini, both printed by Lorenzo. The former by Fra. Antonio di Siena in 1477, the latter in 1481, both in Florence. In the Santo' there are three engravings by Baldini, and Dante he engraved 19; but two only were ready wh book was published; the remaining 17, in the Vatican have been pasted on the blank places left for them. di Lorenzo left a blank place for a print at the head of canto. All these prints were made from the designs of celli. Baldini executed many other prints, which are at length by Bartsch and other writers on prints. Hei Strutt, and others have published copies of some of Bal engravings as specimens of the early Italian style.

(Vasari, *Vite de' Pittori*, &c., in the Life of Mar Strutt, *Dictionary of Engravers;* Heineken, *Nach von Künstlern;* Bartsch, *Le Peintre-Graveur.*)

BALDUNG, HANS, called also Hans Grün, a cel old German painter and wood-engraver, the contem and the friend of Albert Dürer. He was born at Gm Swabia, about 1470, or a few years later, but lived chi Switzerland, at Strassburg, and its neighbourhood. Fr inscription upon a picture of the Crucifixion, in the ch Freiburg in Breisgau, which is considered his master his full name appears to have been Hans Baldung G Grien, for it is there written 'Johann. Baldung, cog. G Gamundianus, Deo et Virtute auspicibus faciebat, 151 is painted upon canvas glued upon wood. His are also variously signed, H. B., H. B. G., and H. G prints are rather numerous. Bartsch mentions two on copper, and 59 woodcuts; and Brulliot states are still many which have been overlooked by Bart dung's latest cuts bear the date 1534. There are folio cuts of horses with this date. The earliest cuts appears to be 1507. His latest works are the be

As a painter he was little inferior to Albert Dü expression, in colouring, or in finish. He painted and history, sacred and profane: the heads are the best his works. The year 1545 is given in several works as the of his death. There is in the gallery of Carlsruhe a studies and portraits by him; and to one of the portraits is the date 1543: on the last leaf is the following 'Hodie Aliquid Cras Nihil.' The very old print reputed date of 1455, and attributed to Baldung by 'Teutsche Academie,' is evidently a double error; the print with so early a date, and if there were, it could by Baldung.

(Füssli, *Allgemeines Künstler-Lexicon*; Heineken, *tionnaire des Artistes*, &c.; Bartsch, *Le Peintre-Gr* Brulliot, *Dictionnaire des Monogrammes*, &c.; Nagler, *Allgemeines Künstler-Lexicon.*)

BALECHOU, JEAN JACQUES, a very French engraver, born at Arles in 1715. His still much valued and eagerly sought for by collectors merit however consisted solely in a perfect mastery graver. In the representation of the natural appear objects, or in the imitation of textures, he has been by many artists. He gave every object the same app The strongest condemnation of Balechou's style, says is to be found in the prints of Woollet. It is certainly defect in a work of art, if the means and method of duction first and principally occupy the attention of server.

He engraved portraits and landscapes. Among th are three from Joseph Vernet, of which the Stor Calm are very celebrated prints. These two prints, opinion of Strutt, were unrivalled until the appear Woollet's plates after Wilson.

Of his portraits, Balechou's masterpiece is the large print of Augustus III., King of Poland, after the pict t forms the frontispiece to the 'Recueil d'Estampes lus célèbres Tableaux de la Galère de Dresde.' wever the cause of Balechou's disgrace at Paris, for l some of the impressions, and even damaged the re he sent it to the king, at whose expense it was His right of election to be a member of the French of Painting, of which he was Agréé, equivalent to e of Associate, was forfeited in consequence, and he Avignon, where he died in 1764.

ken, *Dictionnaire des Artistes*, &c; Watelet et Le- *Dictionnaire des Arts*, &c.; Huber, *Manuel des* , &c.; Strutt, *Dictionary of Engravers.*)

N, HENDRIK VAN, a distinguished Flemish his- inter, and the first master of Vandyck and Snyders, at Antwerp in 1560. He went early to Rome to profession, having acquired the rudiments from Adam

n excellent colourist, a good draughtsman, and h great facility. Of his works, which are nume- f the best is St. John in the Wilderness, an altar- of the chapels of the Cathedral of Antwerp: the is by Velvet Breughel, who painted the landscape of many of Van Balen's pictures. He died in as buried in the church of St. Jacques at Ant- lyck painted his portrait; and it has been en- aul Pontius. The painter Jan Van Balen was endrik.

der, *Leven der Shilders*; Descamps, *La Vie des mands*, &c.; Heineken, *Dictionnaire des Ar-*

RA, ANTO'NIO, a distinguished painter of re he was born in 1666. He was brought up , but before his 21st year he was studying as a r Bellucci at Venice. He afterwards studied tta at Rome, and he eventually painted much style of the Roman than of the Venetian: he bined the chief beauties of Venetian colour with ristic correctness and solidity of design of the l.

as one of the most able painters of his time, and Venice a numerous school, in which were edu- l very distinguished painters, as Giambattista seppe Nogari, and Pietro Longhi. Lanzi men- arly, by Balestra, a Nativity, and a Deposition ss, at Venice; a Santa Chiara at Padua; and a o, at the Dominicans', in Verona. He died in ing to Guarienti, but in 1740, according to Za- tti. Heineken mentions many prints after the stra. He engraved also a few plates himself.

Della Pittura Veneziana; Lanzi, *Storia Pittorica*, en, *Dictionnaire des Artistes*, &c.)

TICHUS. A fossil plant in the laminated litho- tone of Pappenheim, is named Baliestichus orna- erg.

. [Musa, P. C.]

AS, or BANDANNAS, a term originally ap- culiar kind of silk handkerchief made by the e name now commonly given to silk and cotton manufactured in this country, and decorated of similar character, though by a very different e distinguishing peculiarity of a bandana hand- at it has a uniformly dyed ground, usually of blue, ornamented with circular, lozenge-shaped, ple figures, either perfectly white, or in some ow colour. These spots are said to be produced, bandanas, by tying up the parts intended to be low with bits of thread before exposing the to the action of the dye, and thus protecting

Rude as this process appears, British manufac- wing to the difficulty of imparting a sufficiently nd-colour by the ordinary process of calico- le to imitate Indian bandanas successfully, until ntrived for dyeing the whole surface, and after- rging the colour from the spots forming the e agency of chlorine; a plan which, according in the 'Penny Magazine' referred to below, was I. Kœchlin, of Mühlhausen, in 1810, and which ed into effect on a large scale at the Barrowfield ear Glasgow, by Messrs. Monteith and Co., of perfection far exceeding the original Oriental

of this notice being simply to describe the pe- od of discharging the colour from the spots, it is unnecessary to detail the processes by which a uniform colour is imparted to the whole surface of the cloth, on both sides. A number of pieces being thus dyed, they are taken to an apartment containing a range of powerful hydraulic discharging-presses, each of which has a roller at the back, to receive the cloth to be operated upon, and another in front, to receive it after the pattern has been discharged; the intervening portion of the cloth resting upon the bed-plate of the press, which is about a yard square, or equal in size to a single handkerchief. This bed-plate is formed of lead, perfectly smooth and even, and is perforated with holes corresponding with the white spots of the desired pattern; and a similar plate, perforated in like manner, is fixed parallel with, but at a short distance above it. Fourteen pieces of dyed cloth being laid carefully upon one another, are rolled together upon the back roller of the press, and acted upon simultaneously; and, when their ends are drawn over the bed-plate, and secured to the foremost roller, the hydraulic apparatus is brought into action, so that the bed-plate, with the fourteen thicknesses of cloth lying upon it, is raised and pressed with immense force against the upper plate, which is firmly fixed in the press. The bleaching-fluid, which is a solution of chloride of lime, is then poured into a trough connected with the upper plate; and finding its way through the perforations of the pattern, percolates through the fourteen thicknesses of cloth, and escapes through the perforations of the lower plate, its passage through the cloth being sometimes facilitated by a powerful current of air. The extreme tightness with which the dyed cloth is compressed prevents the action of the bleaching-liquid from extending beyond the perforations; and as mechanical contrivances are adopted to ensure the perfect tallying of the perforations in the two leaden plates, the pattern produced by them is very accurately transferred to the cloth. After allowing a few minutes for the action of the bleaching-liquor, it is drawn off, the pressure is removed, and the portion of cloth which has been operated upon is wound on to the front roller, a second portion being, by this operation, drawn forward upon the bed-plate, for a repetition of the process. By means which will be readily understood by those conversant with dyeing and calico-printing, the discharged spots may be made yellow instead of white; and by such an arrangement of the pattern and of the channels for conducting the discharging fluid as will allow two fluids to be used independently of each other, some parts of the pattern may be made white, and others yellow, by one operation. In the establishment above mentioned there are sixteen presses for the production of bandanas; and when these are in full work the period required for the complete discharge of the colour in the first press is equal to that required for bringing the remaining fifteen into action, so that one discharger, with his assistants, can keep the whole in constant operation. The whole routine of operations occupies about ten minutes, so that the sixteen presses (each producing fourteen handkerchiefs at each operation) will produce 224 handkerchiefs at each time of working, the whole being completed within the short space of time mentioned above, and, by the aid of powerful and ingenious machinery, requiring only the labour of four men to effect the various necessary changes and adjustments. A much fuller account of this process, with the details of the discharging press, is given in Dr. Ure's *Dictionary of Arts*, art. 'Bandanna,' and a minute though popular description of the whole manufacture in Dodd's *Textile Manufactures of Great Britain*, pp. 78-85, and the *Penny Magazine*, vol. xiii. pp. 291-293.

BANDON, River. [Cork, P. C.]

BANDON, or BANDON-BRIDGE, an Irish corporate, market, and post town, partly in the parish of Kilbrogan in the barony of Kinalmeaky, but chiefly in the parish of Ballymodan, which extends into the two baronies of Kinalmeaky and East Carbery (East Division); all in the county of Cork: 20 miles south-west of Cork, and 146 south-west of Dublin. The two parishes have an aggregate area of 15,658 statute acres, with a population in 1841 of 14,702.

The town was founded by the English settlers on the forfeited estates of the Earl of Desmond, in the reign of Elizabeth, and takes its name from a bridge over the river Bandon, which flows through it. The Earl of Cork, who had come into possession of the town, added to the previous settlers, in the reign of James I. or Charles I., a colony of Protestants from Bristol; and as the town was walled, it became, in the great civil war of 1641, the chief place of refuge for the Protestants of the neighbourhood, and several conflicts took place between the townsmen and refugees and the revolted

Irish. On Cromwell's approach, the inhabitants declared for the Parliament. In 1688 they expelled the garrison placed here by James II., but were obliged soon after to submit to a detachment of his army. At this time the walls were razed, and have never been rebuilt.

The town is almost entirely comprehended in the boundaries of the parliamentary borough, as determined by the Irish Boundary Act (2 & 3 Will. IV. c. 89), and consists of several streets on both sides the river Bandon, which has a course nearly due east, and over which there is a bridge. The streets are indifferently paved, and only partially flagged. The area of the parliamentary borough is 447 statute acres; it contained, in 1841, 1256 houses, namely, 1180 inhabited, 74 uninhabited, and 2 building; with a population of 1760 families, or 8275 persons. The population of the borough in 1831 was 2007 families, or 9917 persons; the number of houses was 1580, namely, 1436 inhabited, 137 uninhabited, and 7 building. As the present parliamentary limits embrace a larger portion of the town than those of 1831, the number both of houses and inhabitants must have materially decreased in the ten years 1831-41. Of the inhabited houses in 1841, 168 were of superior character; 665 smaller, of from five to nine rooms, but substantial; 274 were mud cottages of more than one room; and 73 mud cabins of only one room. The parish churches of Ballymodan and Kilbrogan are both in the town; the latter on the north, the former on the south side of the river. There are a spacious Roman Catholic chapel, and a nunnery of the Order of the Presentation, with a conventual chapel and a school-room; a Presbyterian meeting-house in connexion with the synod of Munster, and places of worship for the Primitive and Wesleyan Methodists. There are a court-house, where the quarter-sessions for the west riding or division of the county are held in turn, and a county bridewell. The trade of the place has declined: the linen manufacture, which was formerly considerable, is almost if not quite given up; there were in 1837 two banks, two large mills, three breweries, two distilleries, and several tanyards. Coal, corn, and timber are brought up the river to Collier's Quay, three miles from the town. There are two weekly markets, on Wednesday and Saturday, of which the latter is the chief; and there are four yearly fairs for cattle and general merchandise. The meat and fish market is on the north side of the river; the corn, potato, and egg market on the south side. A great number of eggs are sold every spring, and sent to Cork to be shipped for England.

Bandon was incorporated by charter of 11 James I. (A.D. 1614). The corporation, before its abolition by the Irish Municipal Reform Act (3 & 4 Vict. c. 108), consisted of a provost, 12 burgesses, and an unlimited number of freemen. The borough returned two members to the Irish Parliament; but was, on the Union, reduced to one. Before the Irish Reform Act the right of election was limited to the mayor and burgesses. The boundary of the borough was enlarged by the Irish Boundary Act. The constituency in 1835-6 was 367; in 1840 it was 460, showing an increase in the interval of 93; but in 1841 it was only 355.

The living of Ballymodan is a vicarage, of the yearly value of 414*l.* gross, or 367*l.* clear; that of Kilbrogan is a rectory and vicarage, of the yearly value of 719*l.* gross, or 550*l.* clear: both are in the diocese of Cork. There were in the two parishes, in 1834, 17 day-schools with 1355 children on the books, namely, 564 boys and 791 girls. Of these schools one was a classical school founded by the Earl of Burlington, and partly supported by a grant from the Duke of Devonshire; and all the others, except three, were partly or wholly supported by endowment or subscription. One, of 350 to 400 girls, was taught by the nuns of the order of the Presentation. Three schools, for boys, girls, and infants respectively, were taught in a building erected by the Duke of Devonshire; and schools for boys, girls, and infants were supported by the Wesleyans. Beside the day-schools there were, in the two parishes, three Sunday-schools with 667 children.

(*Parliamentary Papers;* Lewis's *Topographical Dictionary of Ireland.*)

BANKRUPTCY. Within the last twenty years (since 1825) there have been three important acts passed relating to the law and administration of bankruptcy—first the general Bankrupt Act (6 Geo. IV. c. 16), which consolidated, altered, and simplified the law; secondly, the act 1 & 2 Will. VI. c. 56, which constituted the Court of Review and a local Court of Bankruptcy for London; and thirdly, the act 5 & 6 Vict. c. 122, which made some alterations in the law and also established country courts of bankruptcy. The last act has been passed since the article BANKRUPTCY, P. C.,
and came into operation on the 11th of November

By 5 & 6 Wm. IV. c. 29, the judges of the C
view were reduced from four to three; and by 5
122, the court is formed of one judge (§ 64). On
vice-chancellors is now chief judge of the Court of

Before the passing of 5 & 6 Vict. c. 122, t
working bankruptcies in the country was as foll
hundred and forty separate lists of commissione
containing the names of two barristers and thre
were appointed by the Lord Chancellor, on th
of the judges, to act in one hundred and thirty-
cities and towns throughout England and Wales
London); and fiats in bankruptcy were directed
missioners in whose district the trader resided.

Under 5 & 6 Vict. c. 122, the Privy Council is
to select towns for the establishment of distri
bankruptcy, and to fix or alter the extent of their
The act limits the number of commissioners of di
to twelve, who must be sergeants, or barrister
years' standing, and each of them is competent
the jurisdiction of the court. Their salary is 20
The number of commissioners appointed for ea
two (with the exception of Exeter, where there i
with two registrars, and from two to four offici
The district courts are auxiliary to each other
debts and examination of witnesses. Fees ar
for to the chief registrar of the Court of Ba
London.

The district courts of bankruptcy already establ
Birmingham, Bristol, Exeter, Leeds, Liverpool,
and Newcastle. The district assigned to each
from forty to upwards of eighty miles in length.
Court of Bankruptcy has an extensive local juri
includes a city of so much importance and so fa
Norwich. The affairs of a bankrupt who has
business in the southern part of the county of Not
administered at the district court at Birmingham
trader has resided in the northern part of the co
is worked at the Leeds court. It is alleged that
mode of administration occasions loss of time an
pense to the estate, from the distance of the di
and some other objections are made, which may
without much difficulty. Thus the practice of
court might be made general. The Leeds co
'with a view to avoid the heavy charges of the
creditor, solicitor, and others travelling a dista
forty to seventy miles, and for their loss of time,
mined to receive the proofs of the petitioning cre
&c. upon depositions made out of court, and have
the solicitors to work the fiat through their agent
and have directed the messengers, instead of the
velling to secure the effects of the bankrupts,
deputies in the nearest towns.' If the distric
proved to be a better tribunal in bankruptcy t
'lists' of country commissioners, several new cou
established so as to divide the country into smal
tions. A court at Sheffield, for example, would
advantage to that town, and would bring Notting
nearer to a court than it is at present; and
present number of seven or even a dozen courts
locally so convenient as the former large num
hundred and thirty jurisdictions, it must be reco
railways have diminished two-thirds or more the
point of time, of most places from each other, an
miles has become equal only to sixteen. Sufficien
has scarcely yet been obtained of the advantages
tages of the plan of district courts. The only o
of expenses which has yet been made public w
when the new courts had been only established a
It purports to show the amount of solicitors' and
bills, up to the choice of assignees, in the first
removed into the district courts, and of the first t
tered in the said courts.

This return, an abstract of which is subjoine
complete as could be wished :—

	Fiats transferred.
Leeds Court	£72
Bristol	79
Newcastle	85
Exeter	98

In the return from the other three courts the so
in one or two instances the messengers' costs are

	Solicitors Bills.	Messengers' Bills.	Total.
am Court:			
ransferred . . .	£56	£10	£66
iats	36	18	54
ter:			
ransferred . . .	81	..	..
iats	38	15	53
ol:			
ransferred . . .	54	..	..
iats	28	12	40

cipal alterations which have been made relating to
ankruptcy remain to be noticed. The 5 & 6 Vict.
0, has added to the list of persons who may be made
'Livery-stable-keepers, coach-proprietors, carriers,
, auctioneers, apothecaries, market-gardeners,
, brick-makers, alum-makers, lime-burners, and
ther persons besides the above and those enume-
eo. IV. c. 16 [Bankrupt, P. C., p. 391] must
with the relief that they can obtain as insolvent
7 & 8 Vict. c. 70, a person not being a trader
meaning of the Bankrupt Acts may present a
e Court of Bankruptcy, and on compliance with
the act may effect a composition of his debts and
tion from arrest; and by 7 & 8 Vict. c. 96, a
wes less than 300*l.* may obtain a similar advan-
the same process. [Insolvent, P. C. S.] The
c. 111, is an act 'for facilitating the winding up
of joint-stock companies unable to meet their
agements;' but the bankruptcy of such com-
to be construed to be the bankruptcy of any
idually. With some special exceptions the pro-
he same as under an ordinary fiat. The act only
npanies defined in the act. [Joint-Stock Com-
C. S.]

of the petitioning creditor is not required to
by 5 & 6 Vict. c. 122, instead of 100*l.*; and if
petition, their joint debts need not exceed
of being 100*l.* Three creditors whose joint
to 100*l.* may petition; and by the same act, § 3,
ancellor may dispense, if he thinks fit, with the
reditor's bond of 200*l.*

Vict. c. 122, § 11, also enacts that when the
y trader has made an affidavit of his debt in the
and of his having delivered a written account of
d demanded payment thereof from his debtor,
y summon the debtor, and require him to say
dmits the demand against him or not. He is also
ake a deposition upon oath in writing, that he
as a good defence to such demand or to some part
h he must specify. If the trader does not appear
ns of the court, or shall appear and refuse to admit
nd not make such deposition as above mentioned,
if he does not pay or compound the debt within
s, or give security for its payment, he shall be
have committed an act of bankruptcy; and if
debt, but does not pay or compound, or give
within the time fixed by the act, he will also
o have committed an act of bankruptcy. The
ed a bankrupt is to have notice thereof before
ion is advertised, and is to be allowed five days
against the adjudication; and if the petitioning
t, the trading, or the act of bankruptcy, appear
he adjudication will be annulled (5 & 6 Vict. c.
A trader against whom a fiat has issued, may be
roof to the court that there is probable ground
that he is about to quit the country, or fraudu-
eal his goods; but any person so arrested may
discharge forthwith (§§ 5, 6). A bankrupt
goods, &c. to the value of 10*l.* is guilty of
able to transportation for life, or imprisonment,
at hard labour, for any term not exceeding seven
period allowed for disputing the fiat has been
5 & 6 Vict. from two months to twenty-one
e appearance of the notice of bankruptcy in the
e time for which clerks and servants of a bank-
m salary and wages in full is reduced from six
ee.

tion effected by 5 & 6 Vict. c. 122, respecting
of considerable importance. The 6 Geo. IV.
d that the certificate should be signed by four-
er and value of the creditors who had proved
0*l.*; or after six calendar months from the last
examination of the bankrupt, either by three-fifths in number and value of such creditors, or by nine-tenths in number of such creditors. But the recent statute of 5 & 6 Vict. c. 122, dispenses with the signatures of the creditors, and the court, which is authorized to act in the prosecution of any *fiat* in bankruptcy, holds a public sitting, of which due notice is given to the solicitor of the bankrupt's assignees, and in the London Gazette, and at such sitting any of the creditors may be heard against the certificate being allowed, but the court will judge for itself of the validity of such objections as are made, and either find the bankrupt entitled thereto and allow the same, or refuse or suspend it, or annex such conditions to its allowance as the justice of the case may require. The certificate will not be a discharge unless the court certifies to the Court of Review in manner provided by the act, that the conduct of the bankrupt as a trader, both before as well after his bankruptcy, has been in conformity to the bankrupt laws. The bankrupt is required to make oath in writing that such certificate was obtained fairly and without fraud. The allowance of the certificate must be afterwards confirmed by the Court of Review, against which confirmation any of the creditors may be heard before the court. Gambling or misconduct, as concealment of property, fraudulent entries in his books, being privy to the proof of false debts, &c., disentitle a bankrupt to his certificate under the act 5 & 6 Vict. c. 122, much in the same way that it did under previous acts.

The salaries of the judge, commissioners, and other officers of the Court of Bankruptcy, amounted, in the year ending 1st of January, 1844, to 49,382*l.*; and 12,326*l.* were paid besides as compensation to the old commissioners and other officers, of which amount 7352*l.* was paid to Thurlow, Patentee of Bankrupts, and 468*l.* to Thurlow, Rev. J., Clerk of the Hanaper. The whole of this sum of 12,326*l.*, with the exception of 2433*l.* paid to thirteen late commissioners of bankrupts, goes to persons who are entitled on the Parliamentary Return 'Hanaper Officers,' of whom the Patentee of Bankrupts receives the sum above stated. This office was and is a sinecure. The judge receives 2500*l.* per annum; London commissioners, 2000*l.* (1500*l.* before passing of 5 & 6 Vict.); commissioners of the country district courts, 1800*l.*; the accountant in bankruptcy (first appointed under 5 & 6 Will. IV. c. 29), 1500*l.*; the Lord Chancellor's secretary of bankrupts, 1200*l*; two chief registrars, 1000*l.* each; the deputy-registrars in London 800*l.*, and the deputy-registrars of the district courts 600*l.* per annum each. The Lord Chancellor is empowered to order retiring annuities of 1500*l.* a-year to the judge, and of 1200*l.* to the commissioners; and also retiring annuities of different amounts to the accountant in bankruptcy, registrars, &c. These salaries are paid out of the fund entitled the 'secretary of bankrupts' account.'

The amount of certain fees taken in the Court of Bankruptcy, London, for the year ending 11th January, 1844, was 2892*l.*; and from 11th Nov., 1842, to 11th Jan., 1844, the fees taken in the seven district courts amounted to 1881*l.* After payments to ushers of the courts, clerks, and other charges, the sum of about 2000*l.* was divided amongst the registrars and deputy registrars under § 89 of 5 & 6 Vict. c. 122.

The sum paid out as dividends to creditors by the accountant in bankruptcy for each of the following years ending 31st December, was:—523,148*l.* in 1841; 661,230*l.* in 1842; 1,067,976*l.* in 1843. On the 1st of January, 1844, the Bankruptcy Fund account was 1,506,407*l.*

The number of bankruptcies gazetted in England and Wales in 1842 was 1273, 1112 in 1843, and 1064 in 1844. About one-half of this number occurred in the metropolis and in Lancashire and the West Riding of Yorkshire.

The general rules and principles of the Bankrupt Laws of Scotland will be found in P. C., p. 399, in a separate article under this head. There is however a recent sequestration act for Scotland (synonymous with bankrupt act in England), the act 2 & 3 Vict. c. 42, passed August 17th, 1839. Its main features of distinction from the immediately previous act (54 Geo. III. c. 137) are these:—It enlarges the class of persons who may be subjected to the process: instead of being a process of which every step must be taken in the supreme court, the sequestration, being awarded there, is remitted to the sheriff's local court where the routine business proceeds under the sanction of the sheriff, who has an authority bearing a general resemblance to that of the commissioner in England. The winding up of the proceedings and the taking the process out of court require the sanction of the supreme judicature. Sequestration reduces the interest which will qualify a creditor to sue for the application of the act and abbreviates the proceedings.

The claim of persons coming within the 2 & 3 Vict. c. 41, are enumerated as any debtor 'who is or has been a merchant, trader, manufacturer, banker, broker, warehouseman, wharfinger, underwriter, artificer, packer, builder, carpenter, shipwright, inn-keeper, hotel-keeper, stable-keeper, coach-contractor, cattle-dealer, grain-dealer, coal-dealer, fish-dealer, lime-burner, printer, dyer, bleacher, fuller, calenderer, and generally any debtor who seeks or has sought his living or a material part thereof, for himself, or in partnership with another, or as agent or factor for others, by using the trade of merchandise, by way of bargains, exchange, barter, commission, or consignment, or by buying and selling, or by buying and letting for hire, or by the workmanship or manufacture of goods or commodities:' (§ 5) unless the debtor consent to the sequestration, he must have been bankrupt, or must have been sixty days in sanctuary within the space of a year, and must have transacted business in Scotland, and must within the preceding year have resided or had a dwelling-house in Scotland. The estates of a deceased debtor may under certain restrictions be sequestrated though he was not bankrupt, and did not come within the above classification. The debt of the petitioning creditor must be 50*l.*; if two petition, 70*l.*; and if three, 100*l.*

(*On the Law of Bankruptcy, Insolvency, and Mercantile Sequestration in Scotland*, by J. H. Burton, Esq., Advocate, 1845.)

The Irish law of bankruptcy has been gradually assimilated to the English law by several recent acts (6 & 7 Will. IV. c. 14; amended by 1 Vict. c. 48, and 2 & 3 Vict. c. 86). There is no separate court of bankruptcy; but there are two commissioners who are empowered to act by a commission under the great seal. There are no official assignees.

In 1841 an act was passed by Congress to establish a uniform system of bankruptcy throughout the United States of North America. The act came into operation in 1842.

In June, 1838, the French law of 1807 on bankruptcy and insolvency was abrogated, and an entirely new law was promulgated, which now forms Book III. of the Code de Commerce (Des Faillites et Banqueroutes).

BANKS. The object of this notice is to show the regulations under which banking institutions in this country are now placed.

Bank of England.—The act 7 & 8 Vict. c. 32, passed 19th July, 1844, provides for the complete separation of the ordinary banking business by the establishment of a distinct department of the bank, called the 'Issue Department,' the sole business of which consists in the issuing of notes under regulations contained in the act. The directors were required, on the 31st of August, 1844, to place to the credit of the Issue Department the sum of 14,000,000*l.*, of which 11,015,100*l.* consists of the debt owing by the public to the bank, and 2,984,900*l.* of Exchequer Bills and other government securities; and also so much of the bullion and coin as is not required in the banking department. The amount of securities thus carried to the credit of the Issue Department, with gold coin and gold and silver bullion (the silver not exceeding one-fourth of the gold), constitute the basis for regulating the issue of notes. For example, in the week when this plan came into operation, the amount of notes in circulation was 28,351,295*l.*, and the amount of securities and coin and bullion which the bank held was the same, consisting of the debt due to the bank by the government, 11,015,100*l.*; other securities 2,984,900*l.*, making 14,000,000*l.*; gold coin and bullion 12,657,208*l.*; silver bullion 1,694,087*l.*; the total being 28,351,295*l.* The amount of the securities may be diminished, but cannot be increased beyond the sum of 14,000,000*l.*, except in a specified case, which will be presently noticed. The expansion or contraction of the note circulation depends therefore upon fluctuations in the stock of coin and bullion. Persons may demand notes of the Issue Department in exchange for gold bullion at the rate of 3*l.* 17*s.* 9*d.* an ounce, but the cost of melting and assaying is at their expense. As bullion comes in, the issue of notes is increased; and a demand for bullion will cause a contraction in the issue of notes. Thus the principle of convertibility is effectually applied to the circulation of the bank by rendering its issues dependent on the supply of the precious metals. The Issuing Department is not to be allowed to circulate any notes beyond the 14,000,000*l.*, except in exchange for gold, without the express consent of three members of the ministry (the First Lord of the Treasury, the Chancellor of the Exchequer, and the Master of the

Mint); and the profits on the circulation of the
the sum of 14,000,000*l.* issued on its own securi
enjoyed by the public. The securities may als
beyond the sum of 14,000,000*l.* when any bank
notes, and the Bank of England may then be aut
order in council to issue notes to an amount not e
thirds of the sum to which the bank which cease
limited. On the 4th of January, 1845, nine
had ceased to avail themselves of the privil
Their aggregate circulation was 160,435*l.* A ret
a copy is given at the end of this notice, is re
made weekly by the Bank to the Commissione
for publication in the London Gazette.

By the act of 1844 a further claim has been m
bank on behalf of the public. The previous Ba
Wm. IV. c. 98) provided for a reduction of 12
cost of managing the unfunded debt, but by th
sum of 180,000*l.* is in future to be deducted. T
of the bank may be abrogated or modified on
months' notice, after the 1st of August, 1855.

Private Banks.—Besides the enactments wh
the Bank of England, the act 7 & 8 Vict. c. 98,
important provisions for regulating other ban
issues. No new bank of issue can henceforth be
England, and only those bankers are now allo
notes who were issuers on the 6th of May, 1844
they cease to issue, they cannot resume this bran
business. The privilege of issuing ceases also if
in May, 1844, had six partners or under, increase
in the firm above six. The issues of each bank
its average circulation for twelve weeks preced
1844; and after the 10th of October following,
issues on an average of four weeks was not t
average circulation for the twelve weeks abov
Banks which become united at any time may
amount of their respective certified issues. Wh
is issued in excess by any bank is forfeited.
issue are required to make a weekly return to
sioners of Stamps for publication in the Lond
the amount of their notes in circulation on eve
the week, and of the average of the week. A
for every period of four weeks is returned mont
aggregate monthly issues of all the banks, distin
vate from joint-stock banks, are also published i
Gazette. The penalty for making a false retu
100*l.*; and, with the consent of the Treasury,
sioners of Stamps may inspect bankers' books, un
for refusal of 100*l.* By 3 & 4 Vict. c. 83, the
culation were only required quarterly; by 4 &
monthly; and by 7 & 8 Vict. c. 98, they are
weekly; and an annual return is to be published
of partners in banks, &c.

Joint-Stock Banks.—All banks which have
partners are termed joint-stock banks, and their
was first permitted by 7 Geo. IV. c. 46, passed
they were not allowed to issue notes in Lond
sixty-five miles of London; nor within these li
bills for any less period than six months.
limits joint-stock banks might issue their own no
essential points they were on the same footing as
Joint-stock banks increased so rapidly, that in J
there were established in England and Wale
with 648 branches, and 32,142 partners, and a
of private banks were thrown open to a joi
prietary. Through the fault of the legislature i
ing regulations for their safe management, many
stock banks were conducted with a reckless disre
principles of banking, which not only involve
holders in ruin, but were injurious to the gener
the country. In 1836 a select committee of
Commons reported on the defects in the constitu
stock banks. The law did not require a revisio
of settlement by any competent authority, and
ciently stringent to secure the registration a
office of *bonâ fide* proprietors, who, having sig
of settlement, were responsible to the public.
of nominal capital varied in different banks fron
5,000,000*l.*, and in one case an unlimited power
of issuing shares to any extent, while at the
bank might commence operations before any c
of shares was subscribed for at all. No rule was
respect to the nominal amount of shares, whicl
5*l.* to 1000*l.*, nor with respect to the amount of p

:, which varied from 5*l*. to 105*l*. Lastly, there was
respecting the number of branches of any bank
nce from the central bank; and the obligation of
notes payable at the place of issue was disregarded.
inary that the mischiefs which ensued from the
few ordinary and simple legislative provisions
seen; but nearly twenty years were allowed to
a comprehensive act was passed 'to regulate joint-
in England.' This is the act 7 & 8 Vict. c. 113,
ed the royal assent on the 5th of September, 1844,
ay of the session. On the same day, another act
c. 111) received the royal assent, entitled 'An
litating the winding up the affairs of Joint-Stock
nable to meet their pecuniary engagements;'
7 & 8 Vict. c. 113, enacts that every banking
more than six persons in England shall be
ding company within the provisions of this act.
3 Vict. c. 110, for the 'registration, incorpora-
ulation of joint-stock companies,' does not apply
mpanies.

w act for regulating joint-stock banks, such of
s are already in existence may be remodelled
isions. Every new joint-stock bank, before it
business, is required to present a petition to
n council, signed by at least seven sharehold-
or a grant of letters patent. This petition must
The names and abodes of all the partners of
ompany. 2, The proposed name of the bank.
nd street, &c. where the business of the bank
d on. 4, The proposed amount of the capital
ng in any case less than 100,000*l*., and the
h it is to be raised. 5, The amount of capital
id up, and where and how invested. 6, The
ber of shares. 7, The amount of each share,
than 100*l*. each. The petition of the proposed
which these particulars are set forth, will be
e Board of Trade, which will report as to the
the act having been complied with; and her
then, if she so think fit, grant the letters patent
The deed of partnership must be drawn up in
th a form approved of by the Board of Trade,
n to any other provisions which may be intro-
ntain specific provisions for the following pur-
r holding ordinary general meetings at least
t an appointed time or place. 2, For holding
general meetings on the requisition of nine or
ders who have at least twenty-one shares. 3,
ication and election of directors, and for general
4, For the retirement of at least one-fourth
s annually, and for preventing their re-election
elve calendar months. 5, For preventing the
purchasing any shares or making advances of
rities for money to any person on the security
shares in the bank. 6, For the publication of
liabilities of the bank once at least in every
or the yearly audit of the accounts of the bank
osen at a general meeting of the shareholders,
directors at the time. 8, For the yearly com-
the auditors' report, and of a balance sheet,
loss account to every shareholder. This deed
ted by the holders of at least one-half the shares
less than 10*l*. on each share of 100*l*. has been
the banking business cannot be commenced
has been executed by all the shareholders, nor
at least of each share has been paid up, no por-
can be repaid without the sanction of the Board
nder letters patent for a term of years not ex-
y the shareholders of a joint-stock bank may be-
y politic and corporate with perpetual succession,
l, and power to purchase and hold lands of such
s shall be expressed in each letters patent.

ating to joint-stock banks contains some other
ich are deserving of notice as improvements.
etween the 28th of February and 25th of March,
required to be transmitted to the Commission-
s, setting forth, amongst other particulars, the
nd firm of the banking company, the names and
of the several members thereof, and of the direc-
s, and other officers; and this document may be
he Stamp-office on payment of a fee of one shil-
of the registered names and places of abode of
rs of the company for the time being must also
l conspicuously placed for the use of the public
The manager or one of the directors is required to transmit from time to time to the Commissioners of Stamps an account of changes which have taken place in the list of directors, managers, officers, and shareholders. The Commissioners of Stamps are to give a certified copy of these memorials on payment of a fee of ten shillings. Persons whose names are in the memorial last delivered, are themselves or their representatives liable to legal proceedings, as existing shareholders. When joint-stock banks were first established, each shareholder was answerable to the extent of his whole property. By 1 Vict. c. 73, they were rendered liable only to the extent of their shares, but the liability did not extend to the shareholders as a body. By 7 & 8 Vict. c. 113, the liability of any shareholder extends equally to the whole body of shareholders as a company; but if execution upon any judgment against the company shall be ineffectual to obtain satisfaction, then any shareholder may be proceeded against. The acts of an individual partner were formerly binding on all the other shareholders, but it is only the acts of an individual director or other officer properly appointed which are now binding on the co-partnership.

The number of joint-stock banks in the United Kingdom on the 1st of January, 1845, was as follows: in England and Wales 114; Scotland 21; Ireland 13; besides 10 joint-stock colonial banks in London. Many of these banks are in a highly prosperous condition, and some have been well conducted from their first establishment. The London joint-stock banks are excluded by the private bankers from the clearing-house.

Banks in Ireland and Scotland.—No alteration has taken place in the constitution of the banking institutions of Scotland or Ireland since the article BANKING, P. C., was written. In the speech from the throne on opening the session of 1845, her Majesty adverted to 'the state of the law in regard to the privileges of the Bank of Ireland, and to other banking establishments in that country and in Scotland,' as likely to engage the attention of Parliament.

The charter of the Bank of Ireland, which would have expired on the 1st of Jan., 1838, was renewed, but it may be withdrawn on twelve months' notice after 1st August, 1845. Its monopoly is far stricter than that of the Bank of England. No joint-stock bank can issue notes, or draw or accept bills, within sixty-three statute miles of Dublin, and beyond these limits they can neither draw nor accept bills for a less sum than 50*l*. nor for any sum upon demand. The district within 63 miles of Dublin comprises a population of 1,500,000, and the Bank of Ireland has here only established six branches, while in the various towns of Ireland beyond the 63 miles limit there are above one hundred branches of joint-stock banks. The Bank of Ireland has altogether twenty-four branches.

In Scotland there are no exclusive banking privileges enjoyed by any particular establishment, but both in Scotland and Ireland the currency of bank-notes under 5*l*. is allowed by law, and it is interference with this peculiarity of their banking systems which is most feared, especially in Scotland.

Statistics of Banks and Banking.—1. The Bank of England made quarterly returns of its circulation, deposits, securities, and stock of bullion, to the end of 1842; after which these returns were made monthly, until August, 1844, when a return in the form given below began to be made weekly:—

An account, pursuant to the Act 7th & 8th Vict., cap. 32, for the week ending on Saturday the 25th day of Jan., 1845:—

ISSUE DEPARTMENT.

	£		£
Notes issued . .	28,128,310	Government debt .	11,015,100
		Other securities .	2,984,900
		Gold coin & bullion	12,463,197
		Silver bullion . .	1,665,113
	28,128,310		28,128,310

BANKING DEPARTMENT.

	£		£
Proprietors' capital	14,553,000	Government securities, including Dead Weight Annuity	13,651,692
Rest	3,209,696	Other Securities .	8,561,399
Public Deposits (including Exchequer, Savings' Banks, Commissioners of National Debt, and Dividend Accounts)	2,787,253	Notes	7,418,075
Other deposits . .	8,714,052	Gold and Silver Coin	691,562
Seven-Day and other Bills . . .	1,058,727		
	30,322,728		30,322,728

The above bank accounts would, if made out in the form used up to August 16, 1844, present the following result:—

Liabilities.	£	Assets.	£
Circulation, inc. Bank post bills	21,768,962	Securities	21,660,091
Deposits	11,501,305	Bullion	14,819,872
	33,270,267		36,479,963

The balance of assets over liabilities, being 3,209,696*l.*, is stated in the above account under the head Rest.

The stock of bullion held by the Bank of England (both gold and silver coin being included in the term bullion) indicates various circumstances connected with the state of trade and with the general condition of the country; and the following table, which shows the stock of bullion in February and August in each year since 1823, is therefore given:—

	February. £	August. £
1824	13,810,060	11,787,430
1825	8,779,100	3,634,320
1826	2,459,510	6,754,230
1827	10,159,020	10,463,770
1828	10,347,290	10,498,880
1829	6,835,020	6,795,530
1830	9,171,000	11,150,480
1831	8,217,050	6,439,760
1832	5,293,150	7,514,000
1833	10,205,000	10,871,000
1834	9,225,000	7,303,000
1835	6,289,000	6,255,000
1836	7,787,000	5,250,000
1837	4,077,000	6,548,000
1838	10,471,000	9,540,000
1839	6,773,000	2,420,000
1840	4,311,000	4,299,000
1841	4,335,000	4,822,000
1842	5,602,000	9,570,000
1843	10,933,000	11,973,000
1844	16,322,000	15,227,000
1845	15,148,583	. .

Sometimes the stock of bullion properly so called exceeds the amount of coin, and sometimes the proportion is the reverse. In the four weeks ending Dec. 14, 1841, the amount of gold coin was 4,270,000*l.*; and of gold bullion 995,000*l.* In the four weeks ending Sept. 17, 1842, the amount of gold coin was 2,750,000*l.*; and the stock of gold bullion, which had been gradually increasing since December, 1842, was 7,106,000*l.* In January, 1844, the proportion of each was nearly equal. On the 4th of November, 1843, the bullion held by the Bank amounted to 12,036,000*l.*, and consisted of gold bullion 5,992,000*l.*; gold coin 4,244,000*l.*; silver bullion 1,737,000*l.*; silver coin 63,000*l.*

2. The average circulation of 208 private banks and 72 joint-stock banks in England and Wales, for the twelve weeks ending April 27, 1844, was—

	£.
Private Banks	5,153,407
Joint-Stock Banks	3,475,446
	8,648,853

This return was obtained, as already mentioned, with a view of fixing limits to the issues of notes. They cannot be increased beyond the amount certified in April, 1844. This total aggregate circulation of 8,648,853*l.* was divided amongst 280 banks in the following proportions:—

	£		£	Banks.
Circulating above	1,000	and under	2,000	2
„	2,000	„	5,000	16
„	5,000	„	10,000	39
„	10,000	„	20,000	81
„	20,000	„	30,000	49
„	30,000	„	40,000	30
„	40,000	„	50,000	21
„	50,000	„	60,000	13
„	60,000	„	80,000	12
„	80,000	„	100,000	10
„	100,000	„	150,000	4
„	150,000	„	200,000	1
„	200,000	„	400,000	1
„	400,000	namely	442,371	1
				280

The aggregate circulation of private and joint-stock banks, in England and Wales, for the four weeks ending Jan. 4, 1845, was—

	£
Private Banks	4,427,71
Joint-Stock Banks	3,059,43
	7,487,14

Thus, allowing for banks which had ceased to April, 1844, the circulation for the month endi 1845, was 1,001,273*l.* below the amount allowed act 7 & 8 Vict. c. 32.

The circulation of private and joint-stock bank to 1845, selecting one return in each year, has lows:—

Quarters ending March,	Private Banks. £	Joint-Stock £
1834	8,783,400	1,458,42
1835	8,231,206	2,188,95
1836	8,353,894	3,094,02
1837	7,275,784	3,755,27
1838	7,005,472	3,921,03
1839	7,642,104	4,617,36
1840	6,893,012	3,940,23
1841	6,322,579	3,644,25

After June, 1841, the returns were made every pursuant to 4 & 5 Vict. c. 50; and the following for one month in each of the following years:—

Four weeks ending	Private Banks. £	Joint-S
April 2, 1842	5,289,050	3,
April 1, 1843	4,716,506	2,
March 30, 1844	4,983,646	3,
Jan. 4, 1845	4,468,898	3,

3. For the four weeks ending the 8th of Februa circulation of the banks of Scotland and Irel follows:—

Chartered, Private, and Joint-Stock Banks, Scotland . . . . .
Bank of Ireland . . . . .
Private and Joint-Stock Banks, Ireland .

The total circulation of all banks in the Unite including the Bank of England, was 35,827,294*l.* 1845.

BANKS, SAVINGS'. [SAVINGS' BANKS, P

BANKS, JOHN, was an attorney in London. profession to become a writer for the theatres, he is as having borne up with unabated enthusiasm against a full share of the miseries incident to th way of life. The seven tragedies which he bear dates extending from 1677 to 1696. He must some time in the reign of Queen Anne. Banks is dramatists who have been despised by the crit literary faults; but whose works have given ex to the skill of great actors, and have in their day popular with the play-going public. The wo said of Banks when the censure of Steele in th repeated, that, in his best known piece 'The Unh ite, or the Earl of Essex,' there is not one good li gives alternate specimens of vulgar meanness an which has not so much as the merit of being origin his dialogue is not destitute of occasional nature and the value of his works as acting plays is v able. It is admitted by Steele, that the play was never seen without drawing tears; and the a touching story, and the natural and dramatic of incidents, to which the success of that pla were yet more admired by the great German c who bestows on the work an elaborate analysis. of Essex' kept its place on the stage till the n century. It was then superseded by the plays Brooke, who successively paid Banks the co stealing from him all the best parts of his trag other works none was so popular: but even his 'Cyrus the Great' abounds in effective dramatic

BANS. [MARRIAGE, P. C.]

BARBAREA (from a former name, Herb S genus of plants belonging to the natural order C has a terete 2-edged pod, the valves convex, w nent longitudinal nerve; the stigma capitate, th single row. Barbarea belongs to the first sub- ciferæ, Siliquosæ, which possess a linear or lin pod opening by two valves. The species of perennial herbs, with fibrous roots and erect llow, arranged in racemes; the pedicels without

, common Yellow Rocket, common Winter Cress,
bara, has the lower leaves lyrate, upper pair of
l as the large roundish subcordate terminal lobe,
t leaf undivided, toothed; young pods obliquely
scarcely longer than broad. It is a native, in
laces, of Great Britain and throughout Europe;
h America. This plant has a bitter nauseous
sometimes cultivated as a spring salad. In
leaves are boiled and eaten. It is often culti-
lens, especially a double variety, which forms a
rder-plant.
, Early Winter Cress, has the lower leaves lyrate,
f lobes as broad as the roundish subcordate ter-
ppermost leaf pinnatifid, with linear oblong entire
plant is a native of France and Great Britain;
in North America. It is called in Germany
er Kraut; in French, *Cresson d'Amerique.* It
in England as American Cress, Black Ameri-
ench Cress, and Belle-Isle Cress. It is used as
more bitter than the common water-cress. It
or eating all the year round. In cultivating, it
wn from seeds, a quarter of an ounce of which
owing ten feet of drill. For winter and spring
ld be sown in the last fortnight of August or
September, on a warm sheltered border. For
ey may be sown every month or six weeks from
gust, a sunny or a shaded situation being chosen
he season. They require water occasionally in
eather. In winter the plants should be shel-
g over them a few light twigs, and over these a
, reeds, or straw. After the leaves are cut the
allowed to remain for another gathering. The
ay be allowed to run to seed.
and *B. stricta* are two species described by
d lately added to the British Flora. A few
nd in the northern parts of Europe and Ame-
he exception of the double yellow rocket, none
are worth cultivating as ornamental. This plant
gated by cuttings, suckers, or dividing the plants

dener's Dictionary;* Babington, *Manual.*)
AUSIA, the name of a genus of plants belong-
tural order Compositæ, the tribe Cichoraceæ,
he Lactuceæ. It has many-flowered heads, a
re, the inner of one row, the outer of short lax
its 4-cornered, all (or the inner ones only) gra-
ed into a long beak. This genus has several
ies, two of which only are natives of Great Bri-
wers are yellow or pale purple. Some of the
ltivated in gardens, where they form a pretty
ivable border-plant. The British species are—
a, with rough runcinate-pinnatifid leaves, erect
nd downy involucre covering half the pappus,
ovate-lanceolate with a membranous margin,
cts, the fruits all equally beaked. *B. fœtida,*
ncinate-pinnatifid leaves, nodding unopened
nd downy involucre as long as the pappus, its
nceolate, acute, downy; the marginal fruits
l, shorter than the involucre, central ones with
alling it. The first species has a stem one or
yellow flowers, purple beneath, and is found in
ets. The second has a stem from six to twelve
ht, with yellow flowers. It grows in chalky
and, but is a rare plant.
German species, has been lately found in several
eat Britain, but it appears most probable that
been introduced by means of clover and other
agricultural purposes.
ra Germanica; Babington, *Manual of British
tologist,* vol. i.)
, WILLIAM, a civilian, father of the author
was born in Aberdeenshire, in 1546. In early
d himself to the court of Mary Queen of Scots,
unes of that princess closing the path to pre-
73 he emigrated to France. With many other
e period, he studied civil law under Cujacius
In 1578 he became professor of law in the
erected University of Pont à Mousson, of which
und Hay was the first rector. In 1600 he
rk in favour of despotic principles: 'De Regno
estate, adversus Buchananum, Brutum, Boucherium, et reliquos Monarchomachos, Libri Sex.' Having quarrelled with the Jesuits, whom he charged with a design to attach his distinguished son to their order, he resigned his chair in 1603, and proceeded to England. He appears to have expected to find favour with King James. His defence of despotic power suited one of the leading opinions of this king. A denial of the temporal authority of the Pope harmonized with another. On this subject Barclay wrote a book against Bellarmin, posthumously published by his son in 1609, with the title 'De Potestate Papæ, an et quatenus in Reges et Principes seculares Jus et Imperium habeat,' which was subsequently translated into English. It appears however that Barclay's adherence to the Roman Catholic faith interfered with his receiving any promotion directly from James. In 1605 he was appointed Dean and Professor of Civil Law at Angers. In the same year he there published in 8vo. a commentary in the titles of the Pandects 'De Rebus Creditis' and 'De Jure-jurando,' dedicated to King James. In the same year he died at Angers. (Irving, *Lives of Scottish Writers,* i. 210-233.) A curious portrait of Barclay is occasionally met with, which brings a high price from collectors. It is surrounded by the armorial bearings of the families of the north of Scotland with which he was connected, and their names, *e. g.* Leslie de Balquhan, Durham de Grange, Innes de Inner-Marke, Gordone de Pitlurge, &c. On a scroll is the legend

> 'Stemmata quid faciunt ? faciunt te sanguine clarum :
> At magis ingenii nobilitate mirus.'

The whole is characteristic of a certain pomp and pride, both of ancestry and individual endowments, which seem to have been displayed by more than one member of this remarkable family.

BARCLAY, JOHN, was born, according to the portrait prefixed to his 'Argênis,' at Pont à Mousson in Lorrain. Winkelmann, who edited his 'Argênis,' at Nürnberg in 1776 with plates, says that the author was born at Aberdeen, but this writer appears not to have kept the circumstances of his life quite clear from those of his father, William Barclay. John studied at the college of the Jesuits in his native place, and the order, observing the dawning of his genius, attempted, according to their usual policy, to add so promising a name to their own illustrious list of brethren. This was opposed by the father, who in 1603 went to England accompanied by his son. He is said by Bayle to have written and printed, when nineteen years old, notes on the 'Thebais' of Statius. In 1604, when his father was paying court to King James, he presented that king with encomiastic verses, which are printed in the 'Delitiæ Poetarum Scotorum.' In the same year he dedicated to James I. part of the famous Satyricon generally known by the name of Euphormio, which he bestowed on himself as author. He professed a strong inclination to enter the service of the English king, but their adherence to the Roman Catholic faith was equally against his own and his father's promotion. He went with his father to Angers in 1605, returned for a short time to Britain, visited Paris in 1606, where he married Louise Debonnaire, and afterwards settled in London. He dedicated the second part of his satire to the Earl of Salisbury, with an encomium in which few have concurred. What will now however, perhaps, be considered the most interesting part of this curious work, is the fourth book, which in 1614 he published under the title 'Icon Animarum,' and dedicated to Louis XIII. It commences with remarks on the pursuits and character of man at the different ages of his life, and contains a series of sketches of the inhabitants of the various known countries of the world. He writes a clear lively style, and is full of matter. In his praise of England he dwells, like Fortescue, on the fertility of the soil, and appears, like him, to think that industry is rather a reproach than a credit to a people, and that the most illustrious condition of man is to live in a land where he does not require to exhaust his energies in labour. In the 'Icon' he speaks much of the maritime character of Britain, and the power the country is capable of exercising at sea. In the mean time, in 1606, Barclay published an account of the Gunpowder Plot: 'Series Patefacti divinitus Paricidii,' &c. In 1610 he edited his father's work 'De Potestate Papæ,' and in 1612 he defended the opinions of the work, and the memory of his father against the attacks of Cardinal Bellarmin and his followers. Of this work, called 'Pietas, sive publicæ pro Regibus ac Principibus, et Privatæ pro Gulielmo Barclaio Parente Vindiciæ,' he subsequently spoke with regret, as exposing him to the displeasure of his own church. In 1615 he passed through France, and settled in

Rome, where Bayle says he enjoyed the patronage of Paul V. He there in 1617 published 'Paraenesis ad Sectarios,' a book more likely to be acceptable to the Holy See than his others. In 1621 was published the first edition of the work by which his name has been best known, 'Argênis:' this is a romance full of incident and description. The style has received the commendations of the greatest scholars, and Grotius in allusion to it spoke of the author as 'Romam Romano qui docet ore loqui.' Scioppius and others however maintain that it contains many Gallicisms. It is generally published with a key to the real names supposed to be represented in fictitious characters. Thus Meleander is said to represent Henry III. of France; Poliarchus, Henry IV., &c. The difficulty however of finding parallels in real history for all the persons and events, suggests that this explanation has no better authority than analogy with the 'Satyricon,' in which real persons were undoubtedly represented under fictitious names. 'Argênis' appears to be entirely a romance, with occasional allusion to historical events. Its popularity was of long duration. The edition referred to in the beginning of this article is the eighteenth. The admiration of Cowper and D'Israeli have made the name familiar to modern English readers. In 1628 there was published an English translation of it in 4to. with the title 'John Barclay his Argênis, translated ovt of Latine into English: the prose vpon his maiesties command by Sir Robert Le Grys, Knight, and the verses by Thomas May, Esq.' Another translation appeared in 1636, and a third in 1772, with the title 'The Phœnix, or the history of Polyarchus and Argenis.' It has been repeatedly translated into French, and Italian and Spanish copies occur in catalogues. The author's latter days appear to have been strangely occupied. He cultivated, with the hope of great gain, bulbous-rooted plants, which from their being said to have no perfume and to be valuable only for the beauty of their colours, may be presumed to have been tulips. Notwithstanding his personal presence in an insalubrious tract where they grew, and his placing two fierce mastiffs as sentinels over them, a perfidious knave is said to have stolen his treasure and dissolved his golden dream. Barclay died at Rome, on the 12th of August, 1621, before he had completed his fortieth year.

(Dalrymple, *Life of John Barclay*; *Works referred to.*)

BARCLAY, JOHN, a Presbyterian clergyman, and founder of the small sect called Bereans, whose peculiar standard of faith is contained in the 11th verse of the 17th chapter of the Acts of the Apostles, where it is said of the Jews of Beroea "That they received the word with all readiness of mind, and searched the Scriptures daily, whether those things were so." He was born at Muthill in Perthshire, in 1734, and studied at the University of St. Andrews, where he took the degree of A.M. While attending the course of divinity taught at that university, he became conspicuous as a supporter of Dr. Archibald Campbell, a promulgator of doctrines which his enemies charged with savouring of Socinianism. In 1759 he was licensed as a probationer by the Presbytery of Auchterarder, so renowned in the late discussions in the Church of Scotland. He was for some time assistant to Mr. Jobson, minister of the parish of Errol in Perthshire; but after some acrimonious discussion, arising apparently from Barclay's inculcating his own peculiar views from the pulpit, that connection was broken. In 1763 he became assistant of the minister of Fettercairn in Angusshire. Here he became the great popular preacher and religious leader of the district, and attracted crowds of auditors from the neighbouring parishes. He appears to have carried to excess the prevalent characteristic of the Evangelical Presbyterians, of inveighing against the Roman Catholics and those Protestant sects which make the nearest approach to them. In 1766 he published a paraphrase of the Book of Psalms, with 'A Dissertation on the best means of interpreting that portion of Scripture." Some tenets supposed to lurk in this production called out the zeal of his presbytery, and proceedings were commenced against him, which however seem to have gone no further than a reprimand. The spirit of theological disputation being raised, he published pamphlets from time to time calculated to fan the flame he had created against himself. On the death of the clergyman to whom he was assistant, in 1772, the presbytery not only defeated his attempt to be appointed successor, but refused him the necessary testimonials for accepting a benefice elsewhere, and he then left the Church of Scotland, and became the leader of a sect of which a few congregations still exist. He preached for some time in Edinburgh, and subsequently in London and Bristol. In London he kept open a debating society, where he
doctrines against all impugners. He died on the
1798. He published several works in which
his own peculiar doctrines, now read only by
Like most sect-founders, he was a man of arde
temper and strong dialectic powers. A mem
supplied to Chambers's 'Biographical Dictionar
Scotsmen,' by a contemporary and admirer.

BA'RIUM, CHLORIDE OF—*Medical*
—This compound never occurs native, but is al
either by the decomposition of the native carbon
or Witherite, as directed by the London Pha
of the sulphate, or heavy-spar, as directed by
College. This last seems the preferable mode,
the abundant occurrence of heavy-spar, but b
so procured is generally purer (Christison); an
employed as a chemical test than in medicine
day, purity is an essential condition for its uti
tallizes in white, transparent, shining, right rh
sometimes in double eight-sided pyramids, or,
poration, in thin plates. (Geiger.) It is per
ordinary temperature of the air, but efflorescent
atmosphere. Its specific gravity is 2·825. It i
bility in water: 100 parts dissolve 43·5 at 60° F
78 parts. Pure alcohol does not dissolve any
spirit, a minute quantity. The only officinal pre
watery solution, Liquor Barii Chloridi.

Chloride of barium possesses acrid-narcotic
taste being irritating and burning. It resembl
chloride of calcium, but is more potent; in pois
action is similar to arsenic, with this difference,
a larger dose to destroy life, and while its loca
marked, producing less disintegration of the
more rapidly absorbed, and produces death mor
is rarely employed as a means of self-destructio
tional injury to others. Fortunately an effi
exists in agents readily procured, and invariabl
speedily administered. Any alkaline sulphate,
or Glauber salts, or sulphuric acid greatly dil
stantly form an insoluble and harmless sulpha
Medicinally this compound is employed in ver
in various forms of scrofula. It possesses slight
improves the appetite, and promotes absorption
glandular enlargements. It once enjoyed, ch
testimony of Hufeland, a high celebrity. B
other muriates once confided in for the removal
has almost fallen into disuse, particularly sin
become known. Some practitioners, thinking t
which are thought singly to be of use, must
combined, have formed an iodide of barium.
disagreeable nauseating taste. It is given in t
eighth of a grain, in some aromatic water, thre
An ointment is also formed of it.

Pure air, exercise, regular, and above all early
priate diet, and other points of regimen, such a
ing, will do more to eradicate scrofula than any

(Lugol, *On Scrofula*, translated by Ranking,

BARKER, BENJAMIN, a landscape pai
and the brother of the more distinguished Th
If the ability of a painter could be measured by
notoriety he enjoyed, Benjamin Barker must ran
able landscape painters. His works are little
the circle of his acquaintances. He was howev
very great ability: his execution was most hap
and he was equally happy in the spots which
the subjects of his pencil. His subjects were chi
near Wick-Rocks, Claverton, Midford, Westo
ton-Cliffs. The perfect fidelity of Barker's lan
friend, 'is not more striking than the delica
which the aspect of what lay before him has
He published a set of 48 views, engraved in
Theodore Fielding. He died in March, 1838
the house of his son-in-law, at Totness in Devo
Union, February, 1843.)

BARKER, EDMUND HENRY, was born
1788, at his father's vicarage of Hollym, in Y
entered in 1807 as a student of Trinity Colleg
but, although he resided, and obtained a medal
Latin epigrams, he did not take any degree, hav
scrupled to subscribe the bachelor's oath. Up
university, he became amanuensis to Dr. Parr, i
at Hatton he resided in that character for sever
then married and settled at Thetford, in Norf

ad compilations which were the business of his
e, Thetford was the scene for nearly twenty-five
the mysterious capitals O. T. N., with which it
is whims to decorate his name in title-pages, were
ided to indicate the town and county of his resi-
e last few years of his life were marked by painful
fortune. They were spent chiefly in London,
lied, after a short illness, on the 21st of March,

ker's writings in classical philology and criticism
ous. He was a constant and leading contributor
py's Classical Journal, almost from its commence-
s close in 1829; and he furnished many papers
r periodical publications. He edited, with English
e use of schools, portions of several of the classics,
and Latin; among which were works of Æsop,
itus, and Cicero, of Xenophon and Demosthenes.
ness both for accumulating and for bringing forth
his gatherings did not allow him to confine himself
ubjects. He published a volume in which he be-
lf to have disproved Sir Philip Francis's authorship
s of Junius; he was the author of a letter addressed
es in 1823 in support of the Greek cause; and
thor, or rather the compiler or editor, of a curious
nfully undigested mass of literary anecdotes and
roted to the memory of his friend Dr. Parr, and
riana,' 2 vols. 8vo. 1828. His correspondence
scholars engaged him also in the superintend-
al works of other men; the chief among which
iglish impression of Anthon's edition of Lem-
cal Dictionary, and of Noah Webster's English

arker's name has been known most widely, both
l censure, through his contributions to Greek
The latest work of this kind in which he
the Greek and English Lexicon published in
h he was the coadjutor of Professor Dunbar of
But an undertaking at once more laborious and
y was Mr. Valpy's spirited reprint of Henry
hesaurus Graecae Linguae,' London, 1816-1828,
Although the editorship of this work was de-
ted in more than one person, and although the
editors were never unequivocally announced, yet
tood universally that the severe duties involved
hip were really performed by Mr. Barker almost
assistance. The Index cost him three years'
1819, after the publication of a few parts, the
t severely criticised in the forty-fourth number
erly Review. Mr. Barker himself maintained
cism was prompted by resentment, on account of
n eminent scholar, which he had inserted in the
nal, and reprinted in a volume entitled 'Classical
Recreations.' Accordingly, while Mr. Valpy an-
eview in his own Journal, Mr. Barker defended
t his supposed assailant in an eccentric and desul-
ed 'Aristarchus Anti-Blomfieldianus.'
said, that during Mr. Barker's life he was
censured by the leading scholars of our own
e he enjoyed no inconsiderable reputation on
. The low state of his celebrity at home was
ral causes. Some of these will prevent him
er highly rated as a classical critic. He was,
y admitted, deficient in exact familiarity with
ose branches of philology in which lay the
orson and his school; while in other points,
. and Latin etymology, and information in his-
and geography, he was much behind the present
edge. But his mind had inherent defects which
ould have quite eradicated. It was eminently
in comprehensiveness of thought and in logical
iocination; and his taste was as defective as his
is merit was that of the collector, not that of
r, or even the critic. But he earned faithfully,
to obtain without reserve, such praise as may
by unwearied and disinterested labour. No
arder than Mr. Barker: no man worked with a
inded desire for disseminating that which he
e valuable knowledge. Those who knew him
from correspondence, allow that he was a kind
t man.

ROBERT, born at Kells, in the county of
d, was the inventor and patentee of panoramas.
originally as a portrait painter in Dublin and in
Edinburgh. The first picture of the kind which he painted was a view of Edinburgh, exhibited in Edinburgh in 1788, and in London in 1789, but with indifferent success. His second panorama was a view of London from the Albion Mills, and it was exhibited, with complete success, in Castle Street, Leicester Square, and afterwards in Germany. He built, and opened in 1793, with a panorama of Spithead, the present panorama exhibition-rooms in Leicester Square, now the property of his son, who has surpassed his father in the same description of painting. He was assisted in many of his panoramas by his son, and by R. R. Reinagle, R.A., from whose sketches most of his foreign views were painted: as Rome, the Bay of Naples, Florence, Paris, Gibraltar, and the Bay of Algesiras. Nelson's battles of Aboukir and Trafalgar were also among his most popular panoramas. He died in London, in 1806.

BARLOW, FRANCIS, a native of Lincolnshire, in which county he was born, in the early part of the seventeenth century, about 1626. He was instructed by a portrait painter, but he preferred landscapes, birds, fishes, and animals, in which he excelled. He was particularly excellent in birds of prey, which he painted on the wing with great skill, particularly in drawing. As a colourist he was indifferent; on which account many of his works appear much better in engravings than as pictures. John Overton published 12 prints by Hollar, after Barlow, representing various sports, of hunting, hawking, and fishing. Barlow himself likewise engraved: he etched some of the plates of his own illustrations to Ogilby's translation of Æsop's Fables, and also part of the plates in the folio book of poems entitled *Theophila*, published for Edward Benlow in 1652. There is also a book of birds by Barlow, engraved by W. Faithorn: 'Diversæ Avium Species studiosissimè ad vitam delineatæ per Fran. Barlow, ingeniosissimum Anglum Pictorem. Guil. Faithorn excudit, 1658.'

Once, when sketching in Scotland, he saw an eagle endeavouring to fly away with a cat in its talons; but the cat struggled so much, that eagle and cat both fell to the ground together: this circumstance led him to engrave a plate of an eagle flying away with a cat. There is a copious list of his prints in Heineken's Dictionary.

Barlow was employed by several noblemen and gentlemen to paint ceilings, with hawking subjects, or other scenes of birds on the wing: the birds were painted on the clear sky. He painted also a few portraits, among them a half-length of General Monk, first Duke of Albemarle. Though he was very much employed, and had a considerable sum of money left him by a friend, he died poor in 1702.

(*An Essay towards an English School*, 1706; Walpole, *Anecdotes of Painting*; Strutt, *Dictionary of Engravers*; Heineken, *Dictionnaire des Artistes*, &c.)

BARRET, GEORGE, an Irish landscape painter of great celebrity in his time. He was born at Dublin in 1732, and commenced his career by colouring prints for a printseller of the name of Silcock. His first landscapes were painted from the estate of the Earl of Powerscourt near Dublin; and the earl was his first patron. In 1764 he obtained a 50-guinea premium from the Society of Arts in London; the first premium given by that Society for landscape. He was one of the original members of the Royal Academy, founded in 1768, and towards the close of his life he was Master Painter to Chelsea Hospital, an appointment which he procured through his friend Burke. He died at Paddington in 1784.

Barret's landscapes are bold and natural in design, but his colouring is somewhat peculiar and heavy. He painted also in water-colours, and executed a few etchings.

(Edwards, *Anecdotes of Painting*, &c.; Pilkington, *Dictionary of Painters.*)

BARRY, LODOWICK, was the author of a comedy called 'Ram-Alley, or Merry Tricks,' which was first printed in 1611, again in 1636, and will be found in the successive editions of Dodsley's Old Plays. Both for liveliness of incident, and for spirit and humour in dialogue and in character, it is one of the very best of our old English dramas. In regard to the author nothing is known with certainty. He is said however to have been an Irish gentleman; and the editors of the 'Biographia Britannica' have given his name a place in their work for the purpose of contradicting Anthony Wood, who insisted on making him a Lord Barry.

BARTAN, or BARTIN, River. [PARTHENIUS, P. C.]

BARTOLI, PIETRO SANTO, an Italian painter and engraver, born at Perugia in 1635. As an engraver he obtained a great reputation, more however from the subjects and the number of his prints than for any particular excellence of execution. He was the scholar of Nicholas Poussin, from whom he probably, in some degree, derived his great love of the works of antient art. As a painter he did very little beyond copying, in which he was so excellent, that even Poussin himself had difficulty in distinguishing between his own pictures and the copies made of them by Bartoli. Bartoli had a correct appreciation of the merits of Greek design, and though technically his prints have little excellence, they are in most cases true to their originals. His prints, mostly etchings, which amount to many hundreds, are chiefly from antient bassi-rilievi or paintings in the ruins in or about Rome and other Italian cities. He was also a printseller, and established a business in Rome, which was continued after his death by his son Francesco Bartoli. P. S. Bartoli died in 1700.

Winckelmann was a great admirer of his works, and recommends young artists to study them in order to acquire a proper appreciation of antient art. They are free, but slightly executed, and all in the same style. The following are among the principal collections executed by Bartoli:—'Admiranda Romanarum Antiquitatum ac Veteris Sculpturae Vestigia,' with remarks by Bellori; 'Romanae Magnitudinis Monumenta;' 'Veteres Arcus Augustorum triumphis insignes, ex reliquiis quae Romae adhuc supersunt;' 'Le Pitture Antiche delle Grotte di Roma e del Sepulchro de' Nasoni;' 'Gli Antichi Sepolchri, ovvero Mausolei Romani ed Etruschi, trovati in Roma;' and 'Recueil de Peintures Antiques imitées fidelement, pour les couleurs et pour les traits, d'après les dessins coloriés faits par P. S. Bartoli,' Paris, 33 pl. folio, 1757. Of the last work thirty copies only were published of the first edition: a second but inferior edition was published in 1787, with a few additional plates, but it is inferior to the earlier work. Bartoli executed a great variety of other works, single and in sets, from antient and modern works of art.

(Pascoli, *Vite de' Pittori, &c. Moderni*; Lanzi, *Storia Pittorica*, &c.; Heineken, *Dictionnaire des Artistes*, &c.)

BARTSCH, ADAM VON, a distinguished designer and engraver, born at Vienna in 1757. He was educated in the School of Engraving at Vienna, under Professor Schmützer, and distinguished himself in his sixteenth year by a set of engravings of all the gold and silver medals struck by order of the Empress Maria Theresa, through which he obtained the appointment of scriptor in the royal library. In 1781 he was appointed keeper of the prints of the royal collection, which led eventually to the publication of his well known work 'Le Peintre-Graveur,' in 21 vols. 8vo., 1803-21, the description of the greater part of the works of the principal engravers of Europe, and to which he now chiefly owes his reputation, though he is the author of several similar works on a smaller scale, but they are all more descriptive than critical. His etchings also are numerous, amounting to 505, dated from 1782 until 1815, including imitations of old etchings and drawings, prints from his own designs, and from the works of other masters. Bartsch added much to and completely rearranged the immense imperial collection of prints at Vienna.

In 1812 Bartsch was decorated with the order of Leopold, and in 1816 he was appointed principal Custos of the Imperial Library of Vienna: he had also the titular rank of hofrath, or aulic-councillor. He died at Vienna in 1821.

A complete catalogue of Bartsch's etchings was published by his son in 1818. He was the author of the following catalogues, published at Vienna:—'Catalogue raisonné des desseins originaux des plus grands maitres anciens et modernes, qui faisoient partie du Cabinet de Prince Ch. de Ligne,' 1794; 'Anton Waterloo's Kupferstiche ausfürlich beschrieben,' 1795; 'Catalogue raisonné des estampes gravées à l'eau forte par Guido Reni et ceux de ses disciples, S. Cantarini, Jean André, Elizabeth Sirani, et Laurent Loli,' 1795; 'Catalogue raisonné des estampes qui forment l'oeuvre de Rembrandt et ceux de ces principaux imitateurs, composé par Gersaint, Helle, Glomy, P. Yver,' Nouv. ed. 1797; 'Catalogue raisonné de toutes les estampes qui forment l'oeuvre de Lucas de Leyde,' 1798; 'Catalogue raisonné de l'oeuvre d'estampes de Martin de Molitor,' Nürnberg, 1813; and 'Anleitung zur Kupferstichkunde,' 1821. He published also in 1797 an edition of the Triumph of the Emperor Maximilian I., with a French translation of the old German text, 'Le Triomphe de l'Empereur Maximilien I., en une suite de cent trente-cinque Planches,' &c.

(Nagler, in the *Neues Allgemeines Künstler-Lexicon*, who quotes the 'Kunstblatt' for 1821, No. 84, and the
und-Anzeigeblatt' for 1822, No. 17 ff.)

BARTSIA (in honour of John Bartsch, M.D.,
Linnæus), a genus of plants belonging to the n
Scrophulariaceæ. It has a bell-shaped 4-fid caly
ringent corolla, a pointed many-seeded capsule, the
pressed at the hilum, with winged ribs on the back.
but one British species, the *B. alpina*, which has
site, bluntly serrate, slightly clasping leaves.
plant, and only found in alpine pastures. The
of Smith's English Flora is now referred to
Euphrasia, as *E. Odontites*. [EUPHRASIA, P.
alpina is found in subalpine regions, throughout

B. maxima has a branched stem, opposite
alternate superior ones, oblong, bluntly and coa
lower lip of corolla longer than the upper one
the lower lip obtuse, equal in size. It is a nat
and attains a height of one and a half or two fee
ago is a native of the south of Europe and Asia.
nata is found in America. *B. viscosa* of Smith is
ago viscosa. It has opposite leaves, the upper one
ovate-lanceolate, sessile, acutely serrate. The gen
differs from Bartsia, in its seeds being slightly ang
minutely crenate-ribbed, with a basal hilum. Bab
Koch both adopt the genus Trixago, but the latte
viscosa of Smith to the genus Euphrasia.

(Don, *Gardener's Dictionary*; Koch, *Flora G*
Babington, *Manual*.)

BASAITI, MARCO, one of the best of the
painters, was born of a Greek family in the Fri
latter part, or probably about the middle, of the fi
tury. He lived chiefly in Venice, where he was
Gian Bellini, to whom he was even superior in som
especially in composition, in accessory groups, and
nagement of the landscape or scene. He was perh
to Bellini in modelling the features, but he was qu
him in expression and in colouring, if not his sup
latter respect. Some of Basaiti's works are still,
among the most brilliant paintings extant. Of c
and some other accomplishments of the more di
painters subsequent to him, are only partially devel
pictures of Basaiti. There are still several of hi
Venice, upon one of which, in the church of San
Castello, is the date of MDXX., and in the church of
there is an excellent picture of Christ praying in t
with the date 1510. The former must have been
last works of Basaiti, for he was probably from
pupil of one of the Vivarini, of Bartolomeo, a
which is strengthened by the fact of his having
picture which Vivarini left unfinished through dea
church of Santa Maria Gloriosa de' Frati. The
St. Jerome, with other saints, and the coronat
Virgin above; and the following distich is writte
according to Moschini:—

> 'Quod Vivarino tua fatali sorte nequisti,
> Marcus Basitus nobile prompsit opus.'

It is painted in distemper, and therefore was p
early work; for after 1473, when Bartolomeo pain
oil picture, distemper was rapidly superseded.
buted this work to Vittore Carpaccio; Ridolfi state
paccio finished it only, and that it was commenced
(Vivarino); and Zanetti repeats the error. Ther
Ascension of the Virgin, by Marco, in the churc
Maria degli Angioli; but his masterpiece is the C
Peter and St. Andrew, in the Academy of Venic
in the old church della Certosa; it is marked MDXI.
There is a repetition of it on wood in the Gallery
marked, according to Mechel, 'Marcus Baxait
There is a beautiful Deposition from the Cross, by
the Gallery of Munich, cabinet xviii.

(Moschini, *Guida per la Città di Venezia*, 181

BASE-FEE. [ESTATE, P. C.; RECOVERY, P. C.
IN-TAIL, P. C.]

BASILIUS. [FATHERS OF THE CHURCH, P.

BASILOSAURUS, the generic title propos
Harlan for a large fossil animal, of which the re
collected in tertiary strata on the river Washita i
The animal was probably 70 feet long. Professo
referred it to the Cetaceans, under the title of Zeu
toides. (*Geol. Trans.*, vol. vi.)

BASIN. In geology, depressions of the strata
by synclinal dips are thus designated, especially
on a large scale. Thus the tertiary basins of Lond

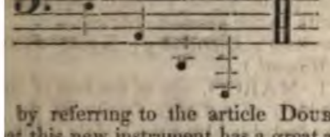
aris, resting on chalk; the coal-basin of South
g on old red-sandstone, and, in a larger sense, the
sins between the Ural, the Scandinavian chains,
enees, Alps, &c. Some of these basins are due
al circumstances of deposition; others have ac-
configuration from elevations and depressions of
graphical areas.

I CA'MERA, a double-base, or *contrabasso*,
size and power, but not in compass, and thus
all or private rooms.
sions of the body of this instrument are as fol-

. . . . .	3	feet.
ore	16	inches.
ler	21	do.
ler the bridge . . .	7½	do.
strings from bridge to nut .	31	do.

strings; two of gut and two covered with silver
portionably thicker than those of the violoncello,
5ths, to the same literal notes as the violin, but
wer than the latter. Ex.:—

1st. 2nd. 3rd. 4th.



by referring to the article **Double-Base**, it
at this new instrument has a great advantage, in
pass, over the other; and in quality of tone it
in chamber music, though neither powerful
esigned to supersede, or even to be used as a
the double-base in the full orchestra.

di Camera, in its present perfect state, owes its
. W. Hancock, of Coventry Street, Haymarket,
introduced November 14, 1844, in Queen
sbury, at the residence of an excellent dilet-
se active research and zealous encouragement
er music is more indebted than to any indi-
resent age. Indeed, it is but justice to add,
gentleman was the first in this country to call
lozart's operas, by having, early in the present
wo or three of them privately got up by a few
; from which time the fame of those unrivalled
y expanded, till the greatest of them, the *Don*
in 1817 produced at the King's Theatre, when,
n, the reputation of its author may truly be said
d its acme.

Y. Under the act of Elizabeth and later acts
down to the passing of the Poor Law amend-
834, the usual practice was for the mother to
to the parish officers, by whom she was car-
magistrates in petty session to be interrogated
paternity of the child. An order of affiliation was
the reputed father was ordered to contribute a
t, or was bound to indemnify the parish against
nses of maintenance. 'In form, the proceed-
the putative father for the indemnification of
t in substance it was a proceeding of the mother
ative father, the benefit of which accrued to
ich the parish was little more than a nominal
when it made good the father's default. It
n action of the mother against the putative
ntribution towards the expenses of their com-
which by a fiction of law, the parish was plain-
law concerning the maintenance of bastards,
e Commissioners, Parl. paper, No. 31, Session
s state of things, the Commissioners of Poor
(1834) recommended that the mother of a
be rendered liable for its maintenance, but
be exempted from the punishment under 30th
, and that all enactments charging the putative
e repealed. The Bill for amending the Poor
in in 1834, as it ultimately passed (4th and
c. 76, §§ 72—76), enacted that the parish
ly for an order upon the putative father, but
done at the quarter sessions instead of the
and corroborative evidence was required;
ulties and onerous conditions were thrown in
showed that 'the object of the Legislature
rather than encourage the applications to
.' The number of bastards affiliated in England and Wales, in the years ending respectively 25th of March, 1835 and 1836, was 12,381 and 9,686. The practice of affiliation was therefore rapidly diminishing under the Poor Law Amendment Act, but it was alleged that the putative father was not punished, while the consequences fell solely upon the woman. In 1839, therefore, an act was passed (2 & 3 Vict. c. 85) which transferred the power of making orders in bastardy from the quarter sessions to any two justices in petty sessions, and facilitated instead of discouraged affiliations. Payments by putative fathers under orders in bastardy, have, under 2 & 3 Vict., c. 85, 'been limited to the cost of the relief actually given; they have been made bonâ fide to the parish, and therefore the parish has not been a purely formal party to the proceeding, and a mere skreen to the woman.' (*Report of Poor Law Commissioners*, Jan. 31st, 1844). The law respecting bastardy has been still more recently the subject of legislation, and by 7 & 8 Vict. c. 101, the principle of charging the putative father is totally different from that of any previous law on the subject. 'Formerly the remedy was intended exclusively for the parish: now the mother alone can obtain it. . . . . . Formerly the chargeability of the child, either in fact or in prospect, was the ground of the remedy: now the actual or probable chargeability of the child is made wholly immaterial.' (*Official Circular*, No. 39, Oct. 1, 1844.) The officers of all parishes and unions are deprived of the power of applying for orders of affiliation with regard to illegitimate children, and the mother alone is entitled to apply, at the petty sessions, for such order; but in case of the death or incapacity of the mother, the guardians of unions, or if there are no guardians the overseers, may enforce an order although they cannot apply for one, and payments are to be made to some person appointed by the justices to have the custody of the child, and not to the parish officers; and such person is to receive the child on the condition that it is not to be chargeable. Parish officers are guilty of misdemeanour for endeavouring to promote the marriage of a mother of a bastard, by threats or promises respecting any application to be made for maintenance. The mother of a bastard may summon the putative father before the petty sessions within twelve months after the birth of the child, for the purpose of affiliation, or at any time on proof of money having been paid to her in respect of such child. The justices may then make an order on the putative father for maintenance of the child and other costs, and enforce the same by distress and commitment; but not more than thirteen weeks' arrears can be claimed. The sum paid for maintenance is to be paid to the mother, and if she neglect or desert her offspring she may be punished under the Vagrant act (5 Geo. IV. c. 83). While unmarried or a widow, the mother is liable for the maintenance of the child until it is sixteen. Any person having the care of a bastard child under an order of maintenance, who maltreats it, or misapplies moneys paid by the putative father for its support, is liable to a penalty of 10*l*. on conviction before two justices. The putative father may appeal to the quarter sessions, as under the old law. All orders for the maintenance of a bastard cease after it has attained the age of thirteen, or on the marriage of the mother. Existing orders are to continue, but those made before August 14th, 1834, are to cease on the 1st of January, 1849.

In the Savings' Bank Act (7 & 8 Vict. c. 83) there is a clause under which the deposits of illegitimate persons who die intestate may be paid to their heirs, as if they had been legitimate; but in other respects the law relating to the succession and inheritance of bastards remains the same. By 6 Wm. IV. c. 22, the incapacity of bastards in England to dispose of their moveable estates by will was removed.

The late Mr. Rickman was the first who attempted to ascertain the number of illegitimate births in England. During the progress of the census of 1831, he obtained from the ministers of churches and chapels the number of bastards born in their parishes or chapelries in 1830. The number returned was 20,039. Under the Registration act (6 & 7 Will. IV. c. 86) no specific reference is made to illegitimate children, but the penalty for making a false statement, combined with the local knowledge of the registrars, in most cases prevents such children being registered as born in wed lock. Still there is no doubt that the registrar's returns will give something less than the real number of illegitimate children born. Of the births which escape the vigilance of the registrars, it is most probable that the proportion of those which are illegitimate is greater than in the total registered births. Still-born children are not registered in England, and here again the proportion is higher for illegitimate births than for births in wedlock. In Saxony the proportion of still-born children to 10,000 illegitimate births is 616, in 10,000 other births 464. Whatever may be the number of illegitimate births as they appear on the face of the register, it may safely be assumed that they are below the actual number. In the Registrar-General's fifth report (p. 10), it was stated that in 1841, out of 248,554 registered births in England 15,639, or 1 in 16, were illegitimate. The Sixth Annual Report issued in February, 1845, gives the total number of illegitimate births registered in England and Wales in 1841 and 1842. In 1841 the number was 35,294, and 34,796 in 1842, or 1 in 15 out of 517,739 births, whereas the returns on which reliance was formerly placed gave 1 in 20. In 1842 the number of illegitimate born boys was 17,810, and of females 16,986, or 21 boys to 20 girls: the proportion of other births is 20 boys to 19 girls. The number of females in England and Wales, between the ages of 15 and 45, was about 3,811,654 in 1841. Of these it is estimated by the Registrar-General, that 1,733,576 were married and gave birth in the above year to 489,894 children, and 2,078,078 were unmarried and gave birth to 35,294. The children born in wedlock were as 28·3 to 100 of the married women, and the illegitimate children were as 1·7 to 100 of the unmarried women.

Before any certain inference can be drawn as to the state of manners in any particular district, the relative number of married and unmarried women should be ascertained; but there are no means of arriving at this fact. The average number of illegitimate and other births for the whole of England is 6·7; but in Cumberland it is 11·4 per cent., and in some districts it ranges from 12 to 18·1 in 100, which latter is the proportion that exists at Wigan, in Lancashire. Nearly all the English towns are below the average of England. In France, Sweden, and most parts of the continent, the towns are above the average of the country.

The tables in the Sixth Report of the Registrar-General show that the highest proportion of illegimate births is in Cumberland, Nottingham, Lancashire, Herefordshire, Norfolk, and Cheshire; and the lowest proportion is in Middlesex, Cornwall, Surrey, Devon, Monmouth, and Warwick. The table showing the proportion for each county would occupy too much space; but grouping the counties into the following divisions, the results are as follows:—

Divisions.	Illegitimate Births.	Females married in 1842, to 100,000 living.	Illegitimate Births to 100,000 females living.	Illegitimate Births to 100 Births.
Northern Counties	6681	1511	609	8·8
North Midland .	2809	1368	494	7·7
York	3849	1457	484	7·2
Northern . . .	2059	1323	481	7·4
Eastern . . .	2552	1344	477	7·9
South Midland .	2569	1341	436	6·7
Western . . .	4234	1429	432	6·8
Welsh . . .	2204	1445	403	6·8
South Eastern .	2913	1351	369	6·4
South Western .	3001	1363	329	5·7
Metropolis . .	1925	1746	190	3·2

The proportion of illegitimate births in 100 births in parts of the metropolis and in towns, in 1841, was as follows:—In Rotherhithe, St. Luke's (Middlesex), Hackney, the Strand (Westminster), it is under 2 per cent.; in Bethnal Green, Islington, St. Saviour's and St. Olave's, Bermondsey, St. George's, Southwark, it does not exceed 2½; in St. George's in the East, Clerkenwell, Shoreditch, Lambeth, Greenwich, and Holborn, it is under 3; in Newington, St. George's, Hanover Square, Kensington, Chelsea, Camberwell, St. Pancras, and St. Giles's, it does not exceed 3½; in Liverpool it is 3·0; Hull, 3·8; in Birmingham, and in the city of Westminster, and in Whitechapel, London, it is 4·1; Plymouth, 4·2; Winchester and Bristol, 4·5; Oxford, 4·6; Derby, 4·7; Cheltenham, 4·9; Sheffield, 5; Northampton, 5·3; Leeds, 5·5; Chichester and Wakefield, 5·6; Manchester, 5·8; Bath, 6; Windsor and Leicester, 6·2; Salford, 6·4; Bedford and Brighton, 6·5; Lincoln and Doncaster, 6·7; Wolverhampton, 6·9; Kidderminster and Coventry, 7; Cambridge, 7·1; Peterborough, 7·4; Ipswich and Worcester, 7·6; Canterbury, 7·7; Maidstone, 7·9; Stockport, 8·1; York, 8·3; Devizes, 8·5; Aylesbury, 8·9; Huddersfield, 9; Halifax, 9·1; Salisbury and St. James's, Westminster, 9·3; Carlisle, 10; Romney Marsh, Tenterden, and Cranbrook, 10·5; Southwell, Mansfield, Preston and Whitehaven, 10·7; Macclesfield, 10·9; Norwich, 11·5; Nottingham, 12·2; Bolton, 12·5; Rhayader, 14·5; Brompton, Cumberland, 17·2; and the proportion at Wigan in 100 births was 18·1, or not far from one in 5. If the mortality of illegitimate children were
the same as that of children born in wedlock, the num
gitimate persons living would exceed one million fo
and Wales. It is both a social and political evil whe
a proportion of persons exist in any society with
ferent nature from those of the majority of the
The condition of an illegitimate child is very
hard one from the moment of its birth. Out of
persons murdered in England, in 1841, five were
infants or children under one year. We have no
tinguishing the number of illegitimate children who
land, but in Saxony 34 per cent. die under the age of
in Sweden, 27, and in Stockholm, 40 per cent.,
deaths of children of the same age born in wedl
26 per cent. in Saxony, 26 in Stockholm, and 16
The number of illegitimate children chargeable on
rate in England was 65,475, in 1835; in 1839
in 1843, 29,699.

The following table of the number and proport
gitimate births in one year in several of the princip
and cities of Europe is derived from the best and
sources, and is given with details in the Sixth Re
Registrar-General:—

States.	No. of Illegitimate births.	Proportion of 100
		Legitimate.
Sardinia . . .	30,474	97·9
Sweden . . .	31,289	93·4
Norway . . .	12,111	93·3
England . . .	34,796	93·2
Belgium . . .	9,354	93·2
France . . .	69,928	92·8
Prussia . . .	42,129	92·8
Denmark. . .	6,020	90·6
Hanover . . .	5,487	90·1
Austria . . .	101,821	88·6
Würtemberg .	8,859	88·2
Saxony . . .	10,512	85·0
Bavaria . . .	30,729	79·4
Cities.		
London . . .	1,925	96·8
Genoa . . .	2,665	91·9
Berlin . . .	4,472	85·0
Frankfort . .	652	82·7
St. Petersburg .	1,809	81·2
Turin. . . .	6,867	81·0
Paris	11,527	71·1
Stockholm . .	5,409	59·3
Vienna . . .	21,763	53·8

BATAVIAN REPUBLIC. [NETHERLAND
159.]

BATHYCLES (Βαθυκλῆς), a celebrated ant
or sculptor, of Magnesia on the Maeander in Lyd
his time is uncertain, several scholars have attem
blish it. Bathycles was the artist who made th
the Amyclæan Apollo at Amyclae near Sparta.
sanias, from whom we learn this, abstains from
information as to the period of Bathycles in a
manner, and for which it is difficult to assign a
says, in his notice of this work:—'I shall not
master of Bathycles, or in what reign the throne
but I saw the throne, and I will describe it as
scholars suppose that Bathycles was contem
Crœsus, because that king sent some gold to
monians, which they expended in beautifying th
Apollo; but it does not follow that they con
throne upon this occasion. It may have been
fore, and Heyne, in his essay 'Ueber den Thro
cläus,' is of opinion that it was made long before
Crœsus, chiefly from the peculiar mythological
the subjects of the sculptures which adorned it.
depend upon the critical judgment of Pausanias
cannot, a remark that he makes in the follow
speaking of the statue of the god himself, migh
siderable weight in controverting the opinion of
there says—'Bathycles did not make the statue
antient, and is made without art;' where the ide
is clearly opposed to the period of Bathycles.
substantially agreeing with Heyne, places Bath
29th Olympiad, contemporary with Archilochus
at the close of the second Messenian war; a
has much in its favour. During the war,
the general of the Messenians, plundered A
Spartans therefore, at the successful completion
might naturally make some votive demonstrati
spoils, to conciliate the god of Amyclae, and

pon his shrine or temple. Yet why should Pausanias
on such a circumstance; or why was there no allusion
trophies in the designs upon the throne? These
s present difficulties, yet probability appears rather to
he earlier period than the later. The early period,
65 B.C., is not so early that it could not have been re-
the opinion of Pausanias when compared with the
of the statue of the god itself; Lydia also was already
for its artists, and Lacedaemon was without native
But in the later period, about 565 B.C., Lace-
as well as other towns of the Peloponnesus, had
artists of name. On the top of the throne Ba-
represented himself and his assistants. Quatremère
, in his 'Jupiter Olympien,' has given a view of
and his throne, designed from the description of Pau-

lycles who left a cup for the wisest man was a dif-
; he was of Arcadia, and lived certainly in the
Solon, but it does not follow that he was an artist be-
made a bequest of a cup. Voss and Sillig suppose
thycles the sculptor lived even after the time of Solon,
the presence of himself and assistants in Lacedaemon
ted for by the Persian conquest of Lydia.
nias, iii. 18 and 19, iv. 18; Heyne, *Antiquarische*
Thiersch, *Epochen der Bildenden-kunst unter den*
1829; Sillig, *Catalogus Artificum.*)

NI, POMPE'O GIRO'LAMO, one of the most
ed painters of the eighteenth century, was born at
1708. His father was a goldsmith, and Pompeo
an early opportunity of displaying his ability for
le established himself very early in Rome, where
Raphael and the antique, and kept himself at first
celebrated pictures, but in a few years he obtained
me in Rome, and with the exception of Mengs,
until his death, for forty years, without a rival:
1787.

vas equally excellent in portrait and history. His
works are chiefly Scriptural and from the lives of
; he painted also many single pictures of saints of
s. His portraits, which are admirably modelled,
nely numerous, and among them are many of the
ersonages in Europe. He painted three popes,
XIV., Clement XIII., and Pius VI.; also the
Joseph II. and Leopold II. of Austria, the Empe-
of Russia, and many others of inferior rank. He
drawing, in tone, and in colour; his execution also
extremely elaborate; but in composition he was
inferior to Mengs, though equal to him in ex-
He was less philosophical also in his subjects than
at he surpassed Mengs in every technical excel-
ept mere academical drawing. They were both
academic, and Batoni has sometimes been honoured
e bestowed more generally upon Maratta, that of
the Romans.'

cities of Italy possess altar-pieces by Batoni, and
also many of his works in Germany and other
ntries; some of his best works are at Lisbon and
rsburg. His principal work at Rome is the Fall
Magus, now in the church of Santa Maria degli
Rome, but painted originally to be copied in
one of the altars of St. Peter's: the mosaic has
executed. Batoni was a Cavaliere and a Ritter of
f Maria Theresa. His friend Car. O. Boni wrote
upon him shortly after his death: 'Elogio di
irolamo Batoni,' Rome, 1787.
, *Geschichte der Mahlerey*, &c.; Lanzi, *Storia*
&c.)

'CHIDA, FOSSIL. The number of fossil Reptilia
to this division is gradually enlarging, though still
To the anourous Batrachians we must, with Jäger
sor Owen, refer the Labyrinthodonts of the new
ne series of Warwickshire and Wirtemberg (in-
rhaps the Cheirotheria whose foot-prints ornament
dstones of England and Germany); while the ter-
of Oeningen (which Scheuchzer imagined to be a
leton) is determined by Cuvier to be analogous to
of Europe, and the Menopoma of North America.
f frogs and salamanders occur in the tertiary brown
f the Rhine Valley.

ACHUS, an architect and sculptor of Laconia, who
e time of Augustus. Pliny tells a story of Batra-
his fellow-countryman Saurus. He says—Being
they built at their own cost two temples to Jupiter and Juno at Rome, enclosed by the porticoes of Octavia, hoping for an inscription; but this being refused them, they introduced their names in another manner, by carving a lizard (Saurus) and a frog (Batrachus) in the centre of the Ionic volutes of the columns, one in each volute. There is still at Rome, in the church of San Lorenzo, a column with an Ionic capital of this description, in which the reptiles are well executed. The story is improbable, and perhaps originated in the peculiar nature of the ornaments; or the architects derived their names from the reptiles, rather than the reptiles their images from the names of the architects.

(Pliny, *Hist. Nat.* xxxvi. 4. 11; Winckelmann, *Werke*, i. 379; Thiersch, *Epochen der Bildenden-kunst*, &c.)

BATTERIES, ELECTRICAL AND GALVANIC. An electrical battery is a number of cylindrical vessels of glass, each precisely similar to the usual Leyden jar, the open top being covered by a plate of wood, into which is screwed the foot of a brass pillar which terminates at the top with a ball of the same metal, and at bottom with a chain which descends to the lower part of the jar inside; and both the inside and outside of each jar are lined with tin-foil to within two or three inches of the top. These are contained within a wooden box, whose interior is lined with tin-foil; a piece of wire passes through the foil and the side of the box, and carries on the exterior of the latter a ring, to which should be affixed a chain descending to the table or ground.

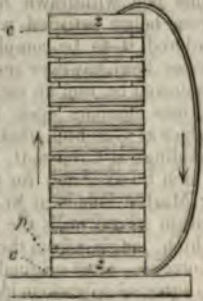
The ball, or knob, at the top of every jar is perforated in order that it may receive the brass rod or system of bars by which the tops of all the jars are to be connected together; the rods are terminated with brass balls, and one of these, or a ball at the upper extremity of a pillar forming part of the system, is presented to the conductor of the electrical machine when the battery is to be charged. This kind of battery was first proposed by Gralath, a German, in 1747; and the manner of charging and of discharging it differs in no respect from the manner of performing the like operations with a single jar.

The quantity of electricity in a jar or battery is directly proportional to the superficies of the coating and to the degree of intensity; and the latter is in the inverse ratio of the thickness of the glass. The particles of vitreous or positive electricity which, by the machine, are excited in the conductor and, with that, on the interior surfaces of the jars, exert, through the glass, attractive powers upon the resinous or negative electricity which, by that attraction, are brought from the earth to the exterior surfaces of the jars: this accumulation within the jars continues till the repulsive powers of the particles are great enough to counteract the power of the machine to supply fluid through the conductor: the charge of the battery is then a maximum. The power of a battery is estimated by the quantity of metallic wire which it will ignite or melt. The battery consisting of 100 jars, which was made by Cuthbertson for the museum at Haarlem, and which contained 550 square feet of coating, ignited 655 inches of iron wire $\frac{1}{150}$ inch diameter.

The batteries in which electricity is excited by the chemical action of a fluid upon a metal, or of two metals upon one another, are called galvanic or voltaic, and are of various kinds: it is intended here to describe only those which are most frequently used.

The simplest combination which can be formed for the production of an electrical current by such means is that of a plate of zinc and a plate of copper placed, generally, in vertical positions and parallel to one another in a vessel containing a diluted acid, the upper edges of the metals being connected by a copper wire. In this state a current of positive electricity passes from the zinc, through the acid, to the copper, and from the latter, along the wire to the zinc: at the same time a current of negative electricity passes from the zinc, along the wire, to the copper, and from thence, through the acid, to the zinc. It is evident that the quantity of fluid furnished by a combination of this kind will be proportional to the superficies on which the acid can act; and an apparatus designated a battery, which may be said to consist of two plates only, one of zinc and the other of copper, was executed for the London Institution. Each plate is 50 feet long and 2 feet wide, and the two are coiled together upon a cylinder of wood, so as to leave everywhere an interval between the two metals: in that interval rope-bands of horse-hair pass round with the coils so as to keep the metals asunder. A cylindrical vessel contains the diluted acid; and when the battery is to be used, the coils of metal are lowered by machinery into the vessel.

But it is more convenient, for the purpose of obtaining the electrical fluids in abundance, to combine together a considerable number of small plates of zinc and copper, alternately, with the acid between them; and that which is called the voltaic pile is a battery of this kind. Under GALVANISM and VOLTAISM (P. C.) are explanations of the electrical action, and we here merely describe the construction of the pile. A circular plate of zinc, *z*, usually about 1½ inch diameter and $\frac{1}{15}$ inch thick, is laid upon and generally soldered to a very thin plate of copper *c*, of equal diameter; and any convenient number of these are placed above one another, with the copper side undermost in all: between every two compound plates is a circular piece of paper *p*, or cloth moistened with diluted sulphuric acid; and the whole column or pile is made to preserve a vertical position by being formed within three pillars of glass or baked wood, which are connected together by having their extremities inserted in boards, of which the lower one serves as a base for the column. The paper or cloth should be rather less in diameter than the plates of metal; and no moisture should be allowed to escape over the edges of the plates.



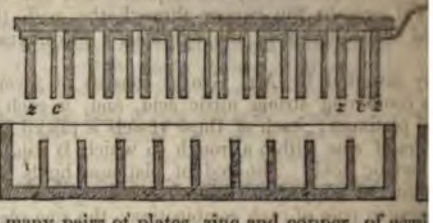
In this state the lowest plate of zinc attracts the positive electricity from the copper below it, and this continually receives a supply from the earth through the table, or the base of the pile; the quantity thus attracted is conveyed to the copper plate immediately above, through the moistened cloth, the latter serving as a conductor: again, the zinc in the second plate attracts electricity from the copper below it, and, at the same time, receives that which is transmitted to the latter from the zinc in the lowest plate. Thus the quantity of positive electricity in the zinc of the second plate becomes nearly twice as great as that which is in the lowest plate; and the process continuing, the quantity in the zinc of each plate above may be conceived to be such a multiple of that which is in the lowest plate as is expressed by the number of the compound plate from the bottom of the pile. There is consequently obtained a current of positive electricity passing upwards from the zinc, through the acid, to the copper; and if a copper wire be made to pass from the top of the uppermost zinc plate to the copper in the lowest plate, the same current will return downwards, so that a circulation of the fluid will continue till the energy of the pile is exhausted. At the same time there is a current of negative electricity passing down the pile from the copper, through the acid, to the zinc, and returning upwards along the wire.

If a second pile be formed, the plates in it may be placed in a reverse order, the copper side above and the zinc side below: if a third pile be formed, the order may be the same as in the first pile; if a fourth, the same as in the second; and so on: then, in uniting them together, a metal wire passes from the copper at the bottom of the first pile to the zinc at the bottom of the second; another wire passes from the copper at the top of the second to the zinc at the top of the third, and so on.

When a wire connects the opposite ends of one pile, or of a system of piles, the circuit is said to be complete: it is said to be broken if there are two separate wires, one proceeding from the copper at bottom, and the other from the zinc at the top. If an animal body were in connection with the farther extremities of the wires it would complete the circuit, and experience shocks.

The opposite extremities of the pile, or of the wires which are in contact with them, are called the poles of the battery. As the current of positive electricity seems to issue from the zinc at the top of the pile, that extremity is called the positive pole of the battery; at the same time the negative electricity seems to issue from the copper at the bottom, and therefore the terminating copper plate is called the negative pole. These designations are reversed when a single pair of plates separated by an acid is mentioned. In that case, since the positive electricity passes from the zinc plate, through the acid, to the copper plate, and that the wire passes through the air from the edge of the copper to that of the zinc plate; it is evident that the positive electricity will flow from the copper, and therefore the copper is the positive pole of the combination; the negative electricity flowing at the same time along the wire, from the zinc, the latter is the negative pole.

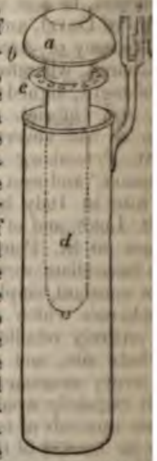
That which, till lately, was most generally used is called the trough-battery, because the acid is contai
formed in a rectangular trough, usually of glazed
by nine or more parallel partitions of the same m
permit no communication between one cell a



As many pairs of plates, zinc and copper, of equ
as there are partitions, are provided; the two pl
pair are soldered or fastened together at their up
ties, so that they may be parallel to one another;
united together by a rod of wood, so that they
be placed into or removed from the cells. The
connections between the zinc and copper plates
over the partitions, so that there is a copper and
in each separate cell, except at one extremity of
in which, till two troughs are connected together,
only a zinc plate. When one trough is to be co
another, in order to increase the battery, a slip of
a, soldered at the top of a zinc plate, is bent and
the cell B, containing only a zinc plate at one en
ceding trough. In order to form the complete
extremity of a wire is made to enter the cell A,
which is the positive end, and the other extremit
to the opposite end of the trough, or series of trou
is placed in contact with the copper slip, as *a*:
current then flows along the wire from the e
mentioned to the other.

That which has been just described is designat
dren's battery, and Dr. Wollaston proposed, as
ment upon it, to have in each cell a zinc plate
of copper; for thus both surfaces of each zin
become efficient in producing the electric curr
power of the battery would be increased by on
battery at the Royal Institution is of Mr. Childr
contains 2000 pairs of plates, each 8 inches long
deep, and with it Sir Humphry Davy made his
coveries.

The battery invented by Professor Daniel co
number of cylindrical vessels of copper, open
about 16 inches high and 3 inches in diameter,
ing a saturated solution of sulphate of copper;
surface of each may be painted, but the interior,
efficient in producing electricity, is made bright. On the top of the cylinder is placed a hemisphere *a* of wood, through which, in the direction of the axis of the cylinder, is a perforation above an inch in diameter; and to its base is attached a short tube *b* of copper, less in diameter than the cylinder, and carrying at its lower extremity an annular plate *c* of copper, in which are pierced several small holes. When the wooden cover is placed on the cylinder its base rests on the top of the latter; and the part of the cylinder between the short tube and the annular plate is filled with crystals or pieces of sulphate of copper, which, gradually dissolving, preserve the
strength of the solution in the lower part of the



To the interior of the short tube is affixed
piece of ox gullet *d*, about the same length
cylinder, and having its lower extremity tied
whole forms a membranous bag; this is to c
sulphuric acid (eight parts water to one of acid
zinc *z*, about the same length as the cylinder,
meter, and terminating at the upper extremity
ball, is passed through the perforation in the wo
interior of the membrane, so that its shoulder r
of the wood; the surface of the zinc being previ

gam of mercury. Instead of a membrane, a bag
anvas, or a vessel of porous earthenware, may be

connection, by means of a wire or metallic rod,
etween the ball at the top of the zinc rod and the
a e which rises from one side of the copper cylin-
c will be corroded by the sulphuric acid and the
l will pass to the copper through the acid, the
and the solution in the cylinder. [VOLTAISM,

ery invented by Mr. Groves consists of several
els containing strong nitric acid, and, in each, a
of platinum; each of these vessels is placed be-
plates of zinc within a trough in which is diluted
muriatic acid. The rod of platinum holds the
plate of copper in Children's battery and con-
negative pole of each combination; the zinc plate
sitive pole.

ry used at first by Professor Wheatstone for his
egraph was formed nearly on the same principle
r. Daniel. A small outer vessel contained a so-
lphate of copper, together with the plate of
h formed the negative pole; within this, a small
ontained diluted sulphuric acid, and at the bottom
am of zinc and mercury, which constituted the
. An electro-magnetic apparatus is now em-
telegraph.

the generic title proposed by Dalman to replace
oostus, which Brongniart gave to some minute
tacea which occur in the Silurian limestones of
es, &c.

NSHÖHLE, one of the bone-caverns in Fran-
land, *Bridgwater Treatise.*)

[GARONNE, P. C.]

OV, VASSILI IVANOVITCH, an architect
among the native artists of Russia, and first
of the Academy of Fine Arts at St. Peters-
n at Moscow, March 1 (13), 1737. While
is said to have manifested a decided taste for
s and buildings, which was his favourite amuse-
hich he endeavoured to improve himself by study-
hes, monasteries, and other public structures of
apital, his earnestness in such task standing
practical method. In 1751 he began to attend
Architecture at Moscow, which was then under
of Prince Uchtomsky, who in 1775 placed him
ecently established Moscow University, in order
study modern languages. Three years after-
Academy of Fine Arts being opened at St.
d youths who gave indications of superior talent
d as pupils, Bazhenov was one of the first.
g his studies there, under Tchevakninsky, with
uccess, he was sent to Paris in 1761, where he
pil of Duval, and would have obtained the gold
cademy of Architecture, but for his belonging
Church, wherefore in lieu of it he was rewarded
of merit, signed by the three eminent architects,
, and Gabriel. Proud of his having obtained
n as had never before been conferred on any
St. Petersburg Academy bestowed on him the
junct,' and sent him forthwith (October, 1762)
hile in Italy he was elected member of the
t. Luke, and of those of Florence and Bologna.
urn to St. Petersburg, in May, 1765, he was
immediate service of the Empress Catherine,
n constant employment in various architectural
schemes which she had conceived, and among
entirely rebuilding the Kremlin at Moscow,
whole site, and erecting upon it a palace that
every monument of antient or modern times.
it certainly would have done so, for the façade
een upwards of four thousand feet in extent, and
y be formed of the pomp and magnificence con-
Catherine and her architect, from the estimate
aircase alone, which was to be entirely of Italian
nting to five million rubles. Even the model
is still preserved in the Kremlin—cost no less
thousand rubles. Nevertheless, although all
had been made, and the first stone of the in-
was laid with great solemnity on the 1st (13th)
3,—on which occasion Bazhenov delivered an
sed by Sumarokov [SUMAROKOV, P. C.],—the
ortly afterwards interrupted, and never resumed.
Still, if greatly diminished in consequence of his plans not being carried into execution, the fame attending so vast a project is not inconsiderable of itself,—as is evident from the renown which one great English architect has derived from what, but for unpropitious circumstances, would have been his greatest work; therefore, alike in fate, Inigo Jones's Whitehall and Bazhenov's Kremlin may be allowed to share alike in fame.

In 1776 he began for the Empress a summer palace, in the Gothic style, at Tzarishtino, but Catherine, who in the meantime had withdrawn her favour from Bazhenov, was so far from being satisfied with the building, that she afterwards ordered it to be completely altered by Kozakov. Her successor Paul however restored him to his former appointments, bestowed on him an estate with a thousand peasants, lavished various honours upon him, and employed him to erect the palace at Gatchina, that at Pavlovsky, and several government buildings at Cronstadt. But the most magnificent structure which he executed for the Emperor Paul was the St. Michael or Marble Palace at St. Petersburg, the vast and massive pile within whose walls the unfortunate Paul was assassinated, and which, judging from the very minute description given of it by Kotzebue, must originally have been most sumptuous; but all its internal splendour has now disappeared, it having been converted into a military school for engineers. Bazhenov is also said to have been associated with Voronikin [VORONIKIN, P. C.] in building the Kazan church, at St. Petersburg. Bazhenov died of paralysis, at St. Petersburg, August 2 (14), 1799. He left a great number of architectural drawings and designs, which the emperor ordered to be published, but Paul's own death, shortly afterwards, frustrated that intention. Bazhenov himself published a Russian translation of Vitruvius, 1790-97, in four volumes 4to.

(Snegirev, *Slovar Ruskikh Pisatelei.*)

BEACHES, RAISED, a term introduced into modern geology to characterise a very numerous class of gravelly, sandy, and shelly deposits, which have been once parts of the sea-bed, and have been raised to constitute dry land in very modern geological periods. It is scarcely possible to assign exactly the limits of these formations, even by the aid of the organic exuviæ which they contain: for while some raised beaches contain only species now living in the adjoining sea, others include one or more extinct species, and thus conduct by insensible gradations from the almost modern shell-beds of the raised shores of the Forth and the Clyde and the variously elevated shell accumulations of Uddewalla and other points of Sweden, to the still richer and more antient (though still to be called Newer Pleiocene) deposits of Sicily. The term Pleistocene (*most* recent), which has come into use, meets this difficulty but feebly, and in fact only draws an arbitrary or epochal line, instead of the soft gradations of long periods which really appear in nature. Nearly all the British, Irish, and European shores furnish examples in abundance: as the shores of the Forth and Clyde, the coasts of Yorkshire and Lancashire, the coasts of Cornwall and Devon, of Wexford, Normandy, Sweden, and the Mediterranean.

BEALE, MARY, an English portrait painter of the seventeenth century, about whom Vertue collected some interesting details from some journals or pocket-books kept by her husband, of which he saw seven. She was the daughter of the Rev. Mr. Craddock, minister of Walton-upon-Thames, and was apparently taught painting by Sir Peter Lely. The first date concerning her works in these pocket-books is 1672; when Lely's visits to her, and his praises of her copies from Correggio and Vandyck, are noticed. In the same year she painted portraits of the Bishop of Chester, Lord and Lady Cornbury, and Dr. Sydenham, besides others; and she received in that year, for paintings, 202*l.* 5*s.*

Sir Peter Lely painted for Mr. Beale portraits of Dr. Tillotson and Dr. Stillingfleet, in Mr. Beale's house, in the presence of his wife, in order, probably, that Mrs. Beale might see his method of painting. Sir Peter (then Mr. Lely) received for the two paintings 30*l.*, of which he took 28*l.* 19*s.* in lakes and ultra-marine. In 1674 Mrs. Beale made 216*l.* 5*s.* by her paintings. It seems a Mr. Manby painted some landscape backgrounds in some of her portraits, for which he was paid in colours of Mr. Beale's making. He was paid two ounces of lake, and one and a half of pink, for a landscape to the portrait of the Countess of Clare. In 1677 she received 429*l.* for pictures; a very large amount. And among the portraits of this year were one of the Earl of Clarendon, and many others of the nobility. She was paid 5*l.* for a head, and 10*l.* for a half-length in oil. In 1681 Dr.

Burnet presented Mrs. Beale with a copy of his History of the Reformation; she appears to have been highly esteemed by the clergy; many distinguished members of that body sat to her. Mr. and Mrs. Beale appear to have been very charitable; from some notes at the end of one of the pocket-books they gave two shillings in the pound to the poor. Her husband, Charles Beale, had an employment in the Board of Green Cloth; he was also a painter and, according to his journals, a colour-maker. Mary Beale died in London in 1697, aged 65, and was buried under the communion-table in St. James's Church. Her husband and two sons survived her. One son, Bartholomew, studied under Dr. Sydenham, and practised as a physician at Coventry; the other, Charles, who was born in 1660, was a painter, and died in London. Her pictures, says Walpole, have much nature, but are heavy in colour. Several of her portraits have been engraved by R. White, P. Vanderbanc, and A. Blooteling. Archbishop Tillotson's has been engraved by White and by Vanderbanc; and the latter engraved that of Archbishop Tenison. Walker painted Mrs. Beale's portrait; and several poems were addressed to her, under the name of Belesia, by Dr. Woodfall.

(Walpole, *Anecdotes of Painting*, &c.; *Essay towards an English School.*)

BEAUMONT, SIR GEORGE HOWLAND, was the seventh baronet of the antient family of the Beaumonts of Stoughton Grange, Leicestershire. He was born in 1753, was educated at Eton, a distinguished amateur of the arts and friend of artists, possessed himself considerable skill as a landscape painter, and is, hitherto, one of the most munificent donors to the British national collection of pictures. He was mainly instrumental in the establishment of the National Gallery; in furtherance of which object he promised to contribute part of his own collection at Coleorton Hall: he accordingly presented to the National Gallery sixteen paintings, chiefly landscapes—a landscape and figures by N. Poussin; Hagar and the Angel, Narcissus and Echo, the Death of Procris, and a study of trees by Claude; a view of Venice by Canaletto; a large landscape and figures by Rubens; a landscape and figures by Both, called Morning; a landscape and figures, called the Return of the Ark, by S. Bourdon; the Villa of Mæcenas, and the Niobe, of Wilson; a portrait of a Jew, and a sketch of the Descent from the Cross, by Rembrandt; a profile of a man by Sir Joshua Reynolds; Pylades and Orestes by West; and the Blind Fiddler by Wilkie. Sir George was one of Wilkie's earliest patrons and best friends. There are also two of his own landscapes in the National Gallery—a small piece on wood, and Jacques contemplating the Wounded Stag, from 'As you like it.' These two pictures were presented by Lady Beaumont after the death of Sir George. He died in February, 1827, without issue. Lady Beaumont, who was the granddaughter of Lord Chief Justice Willes, survived Sir George little more than two years; she died in July, 1829. Sir George was an active member of the Society of Arts.

(Burke, *Dictionary of the Peerage*, &c.; Cunningham, *Lives of the most eminent Painters*, &c., and *Life of Sir David Wilkie; Catalogue of the Pictures in the National Gallery.*)

BECCAFU'MI, DOME'NICO, a very celebrated painter of Siena, of the sixteenth century. According to Vasari, he was born at Siena in 1484, and died there in 1549; others give the respective dates as 1470 and 1551. His real name was Mecherino: that of Beccafumi he derived from his patron Lorenzo Beccafumi, who placed him as a boy with Capanna, an obscure painter, to learn painting. He occupied himself chiefly in copying, and he was especially attracted by some pictures by Pietro Perugino, whose style he acquired, and never lost, notwithstanding a subsequent sojourn in Rome, and the opportunities he had of improving himself from the recent works of Michelangelo and Raphael in the Vatican. He was in Rome during the Pontificate of Julius II., but remained there only two years. He painted in distemper and in oil; better in the former style, and his small figures are superior to his larger ones. Latterly when the fame of Michelangelo in Tuscany attained its extreme height, Beccafumi seems to have felt a necessity for invigorating his own style, and he accordingly forsook his original softness of design for a species of clumsy plumpness, and his heads became harsh and ugly. He was correct in perspective, was fond of reflections and foreshortenings, and excelled all his Sienese contemporaries in energy of composition; in other respects he was surpassed by his great rival Razzi. His best works are in Siena; he executed some at Florence, at Pisa, and some at Genoa for
Prince Doria. He executed also some of the
foot-pavement of the cathedral of Siena; wh
commenced by Duccio di Buoninsegna, accor
but in which, as Von Rumohr has shown, he
The designs of the foot pavement are a specie
outlines of the figures are cut into the stone
afterwards with a black cement. Those of
been engraved by Andreani and Cosati. Bec
a few works in bronze, and is said to have
woodcuts, which, with the prints after his d
masters, are enumerated by Heineken.

(Vasari, *Vite de' Pittori*, &c.; Lanzi, *S*
&c.; Heineken, *Dictionnaire des Artistes*,
Italienische Forschungen; Brulliot, *Dictionn*
grammes, &c.)

BECHERA, a genus of fossil plants prop
Sternberg. Bechera charæformis occurs in the
brookdale. In this genus Sternberg included th
or fossil Charæ of the tertiary strata of the Isle

BECKFORD, WILLIAM, celebrated
wealth, talents, and eccentricities, was the
child of Alderman Beckford, of London, wh
21st of June, 1770, in his second mayoralty,
after his famous exhibition at court, when, aft
city address to George III., and having receive
answer, he made the reply which may be read
went in Guildhall. The alderman had severa
to each of whom he left a legacy of 5000*l.*;
his property, which consisted chiefly of la
Jamaica, and also of the estate of Fonthill,
in Wiltshire, went to his son by his wife,
boy about nine years old, and is said to have
a revenue exceeding 100,000*l.* He had alre
father's death, attracted notice among the
tinguished friends and visitors, by his liveline
tual precocity; and the promise thus given wa
little work which he published in 1780, entitl
cal Memoirs of Extraordinary Painters,' whic
satire upon certain living English artists, an
slang of connoiseurship. He had visited Paris
the society of that capital, in 1778, when he
who gave him his blessing; but he set out on
perly his first continental tour in June, 1780,
between that date and May, 1781, part of Fla
Germany, and Italy. In 1782 he made a secon
and in 1787 another to Portugal and Spain.
had, in 1783, married the Lady Margaret Go
of Charles, fourth Earl of Aboyne, and had the
been returned to parliament as one of the men
In 1784 also he published his remarkable
'Vathek,' in French. More than fifty years
told the writer (understood to be Mr. Cyrus
series of articles entitled 'Recollections of
Vathek,' the first of which appeared in the
Magazine' for June, 1844, that he wrote th
sitting. 'It took me,' he said, 'three days an
hard labour. I never took off my clothes
This severe application made me very ill. . .
hill had a very ample, lofty, loud-echoing h
largest in the kingdom. Numerous doors le
different parts of the house, through dim wi
It was from that I introduced the hall—the i
of Eblis being generated by my own. My in
nified and coloured it with the Eastern char
females in Vathek were portraits of those i
establishment of old Fonthill, their fancied g
ties exaggerated to suit my purpose.' An
tion of the work afterwards appeared, the au
Beckford said he never knew; he thought it
done. In the next parliament, which began
for Hindon; but in 1794 he accepted the Chil
and again went abroad. He now fixed hims
where he purchased an estate near Cintra, and
tuous mansion, the desertion and desolation
years afterwards Byron has described in the fi
'Childe Harold,' in the lines beginning—

> "There thou too, Vathek! England's wealthie
> Once formed thy Paradise."

On his return to England he occupied hims
bellishment of his house at Fonthill; but in 1801
furniture was sold by auction, and this dispersio
the next year by a similar sale in London of
collection of pictures. These proceedings how

o the commencement of a much more magnificent
books, pictures, curiosities, rarities, bijouterie,
oducts of art or ingenuity, and the erection of a
at Fonthill, the most conspicuous feature of which
of great height. Mr. Beckford sat again for
he short parliament of 1806, and also in that which
; and he continued to reside chiefly at Fonthill
en he sold his estate and house there, with all the
the latter, to Mr. Farquhar, for, it was under-
e sum of 350,000*l.* His outlay upon the property
according to his own account, about 273,000*l.*,
er sixteen or eighteen years. The reason he
the writer of the 'Recollections' for disposing of
eduction of his income by a decree of the court of
which had deprived him of two of his Jamaica
You may imagine their importance,' he added,
ll you that there were 1500 slaves upon them.'
is the great tower, which had been hastily and
ructed, and not long finished, fell to the ground.
260 feet high. Mr. Beckford now retired to
he erected another lofty building on the eminence
owne, to the north of that city. Till now his
ation with the general public had rested on his
Vathek;' but in 1834, after an interval of fifty
n appeared as an author by the publication of
his first continental tour (in 1780), in a series
r the title of 'Italy, with sketches of Spain and
ols. 8vo. Lond. He told the writer of the 'Re-
at these 'Sketches' were 'drawn up from notes
in themselves,' but that his memory supplied
ng. It has always been understood however that
ten many years before their publication: indeed
he observes that the letters had 'remained
years,' and that most of them 'were written in
heyday of youthful spirits and youthful con-
eriod when the old order of things existed,' &c.
adds, 'as they happen to contain passages which
nowledged taste have honoured with their notice,
sibly be less unworthy of emerging from the
light than I imagined.' The vivacity, polished
graphic power of these letters were instantly
t; and their appearance from the press was fol-
e year by the republication of the 'Memoirs of
Painters,' and the next by another volume en-
ctions of an Excursion to the Monasteries of
Batalha' (in Portugal), made in June, 1794.
shed by the same qualities with the previous
ly. From this time Mr. Beckford continued
ment till his death on the 2nd of May, 1844.
ughters, the eldest of whom, Susan Euphemia,
o the Marquis of Clydesdale in 1810, and is
chess of Hamilton. Of the tale of 'Vathek,'
n often reprinted, Byron, a good judge on
has pronounced that 'for correctness of cos-
f description, and power of imagination,' it far
ther European imitations of the Eastern style

D. Bedsteads for domestic use, of whatever
commonly made of wood, and of somewhat
ction; but the much smaller space occupied by
of iron and brass, their consequent superiority
at free ventilation which is so important to
great advantage which they possess in not har-
, have led to their very extensive introduction of
e dormitories of barracks, hospitals, and other
ments; while the elegant lightness of some
e last-named material, and the great facility
ey may be taken to pieces, packed in a very
and put together in an exceedingly short time,
em very strongly for camp and travelling use,
many cases, for articles of household furniture.
of bedsteads which claims notice, comprises
contrivances which have been devised for the
alids, and to facilitate the necessary surgical
patients with fractured limbs, or such as have
ng frequent dressing and careful shielding from
idental to even the most careful removal of the
ns of such inventions, several of which, having
experience to be efficient, have been rewarded
for the Encouragement of Arts, Manufactures,
, and described in their 'Transactions' (vols.
xxix., and xlix.), the position of a bed-ridden
varied in every conceivable way with little or
no exertion to himself, and the offices of the attendant and the surgeon may be performed with the greatest possible facility. Even these however have failed in one important point; for however perfect their mechanical arrangements may be, they cannot prevent the distressing consequences which arise from the unequal pressure of a body reduced to a state of extreme debility upon a bed which, however soft, cannot supply a uniform support to every portion of its surface. In many cases where the primary disease or injury has been insufficient to destroy life, mortification and death have ensued from this unequal pressure, notwithstanding the utmost care and the use of air-cushions and down-pillows to mitigate the evil. A painful case of this character having come under the notice of Dr. Arnott, led him to the invention of the hydrostatic or water bed, which consists of a trough lined with thin sheets of metal, and partially filled with water, upon the surface of which floats a sheet of water-proof India-rubber cloth, of sufficient size to completely line the trough when empty, and secured to its upper edge in such a way as to prevent the escape of the water by capillary action. Upon this sheet is laid an ordinary soft feather-bed or mattress, which, floating on the yielding surface of the water, affords a support to the patient comparable only to that afforded by the water of a bath. Every point of the uneven surface of the body having, as it were, its separate column of support, the pressure is so equally distributed as to afford the patient comfortable rest, and effectually to prevent the formation of sores upon the most prominent points. The depth to which the body will sink in such a bed may be regulated by the thickness and buoyancy of the mattress, and any unusual position may be obtained by placing light and bulky cushions or folded blankets under such parts of the body as it may be desired to elevate, just as the position of a body floating in water may be affected by the use of buoys. The mass of water prevents the approach of cold air from beneath, and also, by its non-conducting properties, does not allow of the dispersion of heat downwards, so that, contrary to what might, at first sight, be expected, the hydrostatic bed is a warm one; but as the impermeability of the India-rubber cloth impedes the escape of perspiration, care should be taken, when the patient is unable to leave the bed daily, either to lay a water-proof cloth above the mattress to receive the moisture which would, without it, descend through the mattress, and becoming condensed on the floating sheet below it, would render the bed damp and unwholesome; to lay a blanket, which should be frequently changed, to collect the perspiration which descends from the bed; or to place a layer of small pieces of cork, the interstices of which may afford a degree of ventilation between the mattress and the floating sheet. The perfect adaptability of the surface of such a bed to whatever may be laid upon it, allows the dressing of wounds, the application of poultices, and the performance of other offices of the sick chamber, without disturbing the patient. A full account of this admirable invention, the author of which gave it to the public without taking out a patent, is given in No. 26 of the *Penny Magazine* (Old Series), from the fifth edition of Dr. Arnott's *Elements of Physics.*

BEDSTRAW. [GALIUM, P. C. S.]

BEECHEY, SIR WILLIAM, R.A., one of the most successful of the recent English portrait-painters, was born at Burford in Oxfordshire, in December, 1753, and was originally articled to a conveyancer at Stow. But having a strong love for painting, he determined to pursue it as a profession, and he obtained admission into the Royal Academy in 1772. Though with many able rivals, some of whom were the most eminent painters of the English school, Mr. Beechey early distinguished himself, and was elected an Associate of the Royal Academy in 1793, and was appointed in the same year portrait painter to the queen, of whom he painted a whole-length.

In 1798 he executed his principal work, a large equestrian picture of George III., the Prince of Wales, and the Duke of York, attended by Generals Dundas, Sir W. Fawcett, and Goldsworthy, reviewing the Third and Tenth Dragoons; for which he was elected a Royal Academician and knighted by the king, being the second artist upon whom George III. conferred that honour: the first was Sir Joshua Reynolds. West however had declined the honour. This picture is now at Hampton Court.

From this time Sir William was much occupied, and he painted the majority of all the persons of distinction, rank, and fashion of his time, including several portraits of nearly all the members of the royal family. Among his portraits are also those of Lord Nelson, Lord St. Vincent, Sir W. Hamilton, Lord Cornwallis, Mr. Addington, afterwards Lord Sidmouth, John Kemble, &c. His portraits generally gave satisfaction, especially in their attitudes and expression, which are the most difficult departments of portraiture. His colouring was gay and light, and his earlier pictures were well modelled; but his latest works are negligently executed. There is a portrait of Nollekens by Sir William Beechey in the National Gallery. He died at Hampstead in the month of January, 1839, at the age of 86. He was twice married, and left a numerous family. Captain Beechey, R.N., who was one of Sir E. Parry's lieutenants in his second polar expedition, is the son of Sir William Beechey.

(*Art-Union Journal*, February, 1839.)

BEGARE'LLI, ANTO'NIO, a celebrated modeller of Modena, where he was born about 1498. Who his master was is not known, but he was probably Guido Mazzoni, or Giovanni Abati, the father of Niccolo. He was the friend of Correggio, and is said not only to have instructed that celebrated painter in modelling, but to have even modelled many figures for him to facilitate his labour in the painting of the cupola of Parma, of which the numerous and strong foreshortenings rendered models necessary. There are few of the works of Begarelli left; the principal is the Descent from the Cross in the church of Santa Margherita, containing many figures in the round rather larger than life, and of which, or some others, Michelangelo, says Vasari, remarked, 'Se questa terra diventasse marmo, guai alle statue antiche'—'If this clay were to become marble, woe to the ancient statues:' an extravagant compliment, which the figures do not warrant, in the opinion of Fiorillo, and no doubt truly. There is a tradition that three of the figures of this work were modelled by Correggio, but probably without foundation. He died in 1565.

(Vedriani, *Vite di Pittori, &c. Modenesi*; Tiraboschi, *Vite, &c. Modenesi*; Fiorillo, *Geschichte der Mahlerey*, &c.; Lanzi, *Storia Pittorica*, &c.)

BE'HAM, HANS SEBALD, a very celebrated German painter and engraver of the sixteenth century, whose name has been corrupted into all shapes by many foreign and some German writers. He was born at Nürnberg in 1500, and was one of the best of Albert Dürer's scholars, and was a man of great ability; but his profligacy was, according to tradition, equal to his ability. He was forced, through his bad character, to leave Nürnberg, and he settled in Frankfort, but not to reform, for he here set up a wine-shop and brothel, and is reported to have been drowned by the authorities about 1550, on account of his extreme depravity. This is the account of Hüsgen, who says that it was the practice to condemn various kinds of criminals, and among them pimps, to be drowned: he refers to Lersner's 'Chronik.' Doppelmayr says he went to Frankfort in 1540, and died there in 1550. The particular nature of Beham's depravity is not mentioned further than that he published obscene prints at Nürnberg, and kept a wine-shop and brothel at Frankfort. He must have been however very industrious from the number of his works; and his depravities must have been such as were not inconsistent with industry in his art. As a painter he is scarcely known. His name is written Boehm and Beham by good authorities, and some maintain that his name was Sebald only; but most of his prints, or those attributed to him, are marked with a monogram of H. S. P. and H. S. B. in upright capitals intermingled.

His prints consist of woodcuts, and of etchings and engravings on copper. Those marked with the P. were, according to Sandrart, his earlier works; and those with the B. from about the time that he went to Frankfort. His first instructor was his cousin Bartholomew Beham, likewise a pupil of Albert Dürer, and also of Marcantonio in Italy. Heinecken enumerates 392 prints by Beham, including 58 woodcuts, and 21 done after his designs by other engravers. Bartsch describes even 430, of which 171 are woodcuts. He is reckoned among the so-called little masters, from the extreme smallness of their prints. His prints are much in the style of those of Aldegrever; occasionally correct in drawing, but generally, especially in the draperies, in the Gothic taste. His engravings are superior to his cuts and etchings. His cousin, Barthel or Bartholomäus Beham, was an excellent painter for his period. He was a pupil of Albert Dürer, and was sent by the duke Wilhelm of Bavaria to study in Italy, where he died, says Sandrart, in the prime of life, and, according to Doppelmayr, in 1540, which is also the last date upon his works: he was born about 1496.

Barthel Beham was extremely laborious and
paintings; but if it be true that he studied in
later years of Raphael's time, his taste at design
to him. Yet his picture in the Pinakothek at M
resuscitation of a woman by touching her with
one of the masterpieces of the old German scho
takes place in the presence of the empress Helena
of spectators; and the picture has the following
'Crux Christi ab Helena reperitur, a Macario,
citata, adprobatur. Anno CCXLIII.' There is
collection a picture in a similar style of Marc
ing into the Gulf. Barthel was also an engra
cording to Sandrart, assisted Marcantonio in hi
Raphael. There is a print of Charles V. by Ba
which Vasari seems to have attributed to Marca
prints are better drawn than Hans Sebald's, but
nearly so numerous: they probably do not exceed
are from Greek and Roman history and mytholog
says that some of the prints which bear the na
antonio were executed entirely by Beham.

(Sandrart, *Teutsche Academie*, &c.; Doppel
rische Nachricht von den Nürnbergischen Kü
Hüsgen, *Artistisches Magazin*, 1790; Heinek
naire des Artistes, &c.; Bartsch, *Peintre-Grave*
Dictionnaire des Monogrammes, &c.)

BELEMNITE'LLA. The group of Bele
occurs in the chalk formation, and which is m
anterior and ventral face by a long narrow fis
named generically by D'Orbigny. To this
B. mucronatus, B. granulatus, B. mammillatus, &
and B. Americanus in the United States, if this
distinct from B. mucronatus.

BELEMNITES. To the history of this sing
cephalopodous fossils the progress of careful
lately added very important facts. In addition
stances attending the discovery of some traces
form of the animal at Solenhofen, and of the
horny laminæ at Lyme and Whitby, we have
almost complete restoration of the Belemnite ani
cimens laid open in the cutting of the Great
way, near Chippenham in Wiltshire. The Ox
excavated afforded to Mr. Pratt and the Marquis
ton admirable specimens of the phragmacones
plates, outlines of some of the soft parts of the b
and the form and arrangement of the hooked
the arms. Indeed one of Mr. Pratt's specimen
place and size of the eyes, the funnel or breath
tendinous parts of the mantle, and the lateral
bladder, and ink-duct. (Owen, *Hunterian Le*
Professor Owen, to whom the finest specimens
coveries were submitted, has found a strong re
tween the fossil animal and the group of recent
mals called Onychoteuthis, on whose arms are
cusps, but slender horny hooks. The arms, e
ber, were equal, slender, and furnished with h
all their length, alternating in a double row. T
round, and a little behind the middle of the bo
piola; the caudal extremity pointed, enclosing
guard, the anterior extremity of the laminar
which the ink-bag is placed, nearly transverse, a
so as from analogy with the sepiosteum might h
pected. The Belemnitic animal—a dibranchiate
cuttle—must, in some instances, to judge fro
of the fibrous conical extremity, have reached (a
four or more feet in length, and its figure appea
for swift motion. In the lias deposits whole sho
the species appear to have perished together,
found about the cones many indications of the
animal substances.

The geological distribution of the Belemni
largely examined. In 1835 Professor Phillips
the British Association at Dublin a full account
tures and mode of occurrence of the British speci
names and characters to the principal groups wh
the cretaceous, upper oolitic, lower oolitic, and
M. d'Orbigny has lately published results perfec
derived from a full investigation, especially of th
curring in France. It thus appears that in th
Belemnites are confined as a group to the me
that many species allied to the B. compressus of
necillatus of Blainville, and B. paxillosus of
belong to the lias; that others allied to B. ellipti
B. quinquesulcatus of Blainville, B. Aalensis of

lite series; that others allied to B. sulcatus of
orfensis of Schlottheim, abound in the period
clay; while B. mucronatus, B. quadratus,
ttenuatus, and others now ranked as Belem-
bigny, characterise the cretaceous strata. The
ntered into on this subject are yet incom-
ed; but the reader may refer with advantage
s of Blainville and Volta, to Buckland's Bridg-
, D'Orbigny's 'Palæontologie Française,' and
nterian Lectures.' Figures illustrating several
Mantell's 'Medals of Creation,' vol. ii.

. ANDREW. [Schools, Primary, P. C.]

ORGE JOSEPH, a writer on law and juris-
born at Fountainbridge near Edinburgh, on the
h, 1770. He was educated at Edinburgh,
member of the faculty of Advocates in 1791.
lished, in two volumes 8vo., 'A Treatise on
Bankruptcy in Scotland.' In 1810 he pub-
rged edition of the same work in 4to., with
mentaries on the Laws of Scotland, and on
of Mercantile Jurisprudence considered in
kruptcy, Competitions of Creditors, and Im-
Debt.' A fifth edition of this work was
26, in two large 4to. volumes, with the title
on the Laws of Scotland, and on the Prin-
ntile Jurisprudence.' 'Bell's Commentaries'
to Erskine's 'Institute,' the best known and
sulted work on the law of Scotland. Until
ns in the bankruptcy law there [Bankruptcy,
the leading authority in that department of
continues to afford light on so much of the
ld act as has not been superseded; while in the
ts of mercantile law—vendor and purchaser,
nce, &c., it is still a work of the highest au-
uthor's task was one of peculiar difficulty, as
ntators had generally limited their elucida-
parts of the law of Scotland which affect
the commerce in landed property; and a
mercantile law necessarily involved not only
he results of decisions in Scotland, but also a
neric distinctions in principle which frequently
n like questions in commercial law in England
different from each other. One of the useful
Bell's labours has been an assimilation, without
rtion of principle, of the practice of the com-
Scotland to that which has long existed in
he Commentaries, Sir Samuel Romilly said,
one of the best, if not the very best law-book
blished in my memory.' On the 27th of May,
publication of the third edition of his work,
ved the thanks of the Faculty of Advocates.
'Principles of the Law of Scotland,' which
several editions; 'Illustrations of the Prin-
aw of Scotland;' and several minor works.
ead of a commission of inquiry appointed in
uence of whose report, and of Mr. Bell's
very important organic changes were made
tion of civil justice in Scotland. In 1821 he
Professor of Scots Law in the University of
in 1831 a principal clerk of session. He
1806, Barbara, daughter of Charles Shaw,
He died on the 23rd of September, 1843.

CHARLES, was born at Edinburgh in 1774.
of a clergyman of the Scottish Episcopal
for many years in a small cure at Doune, in
rth. The three elder sons, Robert Bell, John
e Joseph Bell, all attained eminent positions
was a distinguished writer to the signet in
second attained the highest rank in his day
d the third long occupied the chair of Scots
inburgh University. The youngest brother,
receive quite the same academical advantages
is brothers, in consequence of the death of
he was very young. But as he himself said
, 'My education was the example set me by my
most gratefully he always acknowledged the
is mother bestowed on him, her favourite
High School of Edinburgh Charles made no
It was under the eye of his brother John,
he had adopted, that he first gave evidence
ents. He became a first-rate anatomist, and
hundred pupils on that science while com-
. His internal consciousness of ability, however, and the ambition inseparable from it, led him to long for increased opportunities of exertion, and in the year 1804, at the age of thirty, he removed to London. Perhaps the bitter dissensions then raging in the Edinburgh Medical School, in which his brother John was deeply involved, had some effect in prompting him to this escape to a new scene.

At the outset, the prejudices against Scotsmen which Johnson, Churchill, Wilkes, and others had so illiberally fostered, seem to have stood in the way of Charles Bell in London, but he overcame them in time, and became intimate with Sir Astley Cooper, Abernethy, and other great surgeons of the day. His work on the 'Anatomy of Expression,' published in 1806, did much to give him a name in London; and most deservedly so, that treatise being acknowledged by Wilkie, and many illustrious painters, as having deeply influenced their own studies and practice in drawing the human figure. Nevertheless, though advancing by slow yet sure degrees as an operative practitioner, Bell was forced to begin lecturing in a very humble way, having yet obtained no aid from association nor any connexion with the chief medical schools. In the same year (1807) in which he entered on this course, he published his first edition of his 'System of Operative Surgery,' a work which was rendered valuable by its practical character: no single operation was described theoretically, but all from full personal experience. At this period, in some beautiful letters to his brother George Joseph Bell, he describes the dawning upon his mind of those discoveries in the nervous system, which will form his noblest monument in the judgment of posterity. But he also grieves most bitterly, in this correspondence, over the neglect with which the public, generally, treated these early speculations. We may once for all observe, regarding this series of fraternal letters, that if no other proof of the writer's genius existed, they would form in themselves satisfactory testimony to his abilities. His frequent aspirations 'to be chief of his profession in character' indicate a man of no common stamp.

In 1811 he married Miss Shaw, a lady who brought happiness to his hearth, and several of whose relatives have become eminent in their various departments. John and Alexander Shaw (the latter only now living) obtained high reputation as surgeons and anatomists under the eye of their brother-in-law; Patrick, another of the family, is now a distinguished member of the Scottish bar. To Alexander Shaw we owe an able vindication of the just claims of Bell in the field of anatomical and physiological discovery. In the same year (1811) Bell became connected with the Hunterian School in Windmill Street; and in 1814 he was appointed surgeon to the Middlesex Hospital, an institution which he subsequently raised to the highest repute, and which he justly boasts, in 1836, of leaving 'with full wards, and 120,000*l.* in the funds.' It was both from his extraordinary skill as an operator, and from his style of lecturing—which, though not especially eloquent, was striking and suggestive—that his labours were crowned with success, both as regards the patients and the pupils of the Middlesex Hospital.

Bell had already been engrossed by the consideration of cases in Military surgery, when our wounded troops came home from Spain. The battle of Waterloo revived his enthusiasm in this branch of his art, and he visited the battle-field immediately after the battle. Bell did great service to the wounded by his surgical skill on the occasion of his visit, as the 'Life of Sir Walter Scott,' and other authorities more direct, fully prove.

In 1821 Bell produced his first well-known paper on the 'Nervous System' in the Philosophical Transactions. It was read before the Royal Society, and, almost contrary to the long-disappointed author's expectations, excited immediate and wide attention. Fortunately for him, the main views there laid down had been printed in a pamphlet, and issued for distribution among his friends in 1811; for various persons, recognising now the value of the discovery, soon came forward to claim the merit of it. As to this point, the work of Mr. Alexander Shaw, with the recent testimonies of the Royal Society and the College of Surgeons of London, have set the disputed question at rest. Even before he left Edinburgh, Bell, as his letters of the date prove, had obtained a glimpse of the great truths which were afterwards materially evolved by him. In working out these discoveries, he might use the services of pupils; but none of them have established any just claim to the praise due to these great discoveries. Before the time of Bell, all nerves were held to be alike in character, and were considered simply to give more or less nervous susceptibility to any organ, in proportion to the numbers in which they were there distributed. Bell discovered and showed, that the nerves were naturally distinguished among themselves and clearly classified; and that the nerves of sense (whether peculiar or general), and those of motion, were totally distinct in their character and origin. As regards the brain, he exemplified this fact strikingly by his experiments on the nerves of the *senses*, so specially called. A prick to a common nerve of the orbit of the eye produced pain, as he demonstrated; a similar touch on the optic nerve gave no pain, but an impression of a flash of light. He found the difference betwixt the peculiar and primary nerves of hearing and taste, and those which give to the organs of these senses the ordinary kind and degree of feeling, and to their muscles the power of motion or contraction. He, in fact, laid bare, for the first time, the great fact of a distinction existing in the nature and quality of the nervous energy, which before his discourses had been all huddled together under one interpretation. As respects the body and spinal marrow, Bell discovered a division of the nerves, perfectly analogous to that detected by him in relation to the brain. The common nerves distributed over the animal trunk fulfil the two grand functions of giving sensation and motion. On cutting a spinal nerve, the older anatomists found both feeling and motion to be lost by the part which is thence supplied with nervous energy, and they concluded that the nerve carried both qualities conjointly. But Bell looked deeper into the matter, and he was rewarded by the discovery, that the two roots, by which the spinal nerves are connected with the vertebral medulla, derive and bear from them different qualities—the anterior root conveying the motor power, and the posterior that of sensation or the sensor power. Following up his inquiries, he discovered, likewise, the special nerve of respiration, and others with particular qualities, as to which before his time not even a conjecture had been made.

It is impossible in a brief sketch to advert to all the great practical results consequent on these discoveries. The puzzling cases which often occurred, where sensation or motion were singly or severally lost, became clear to the eyes of competent practitioners; and operators received a warning and guidance which may have already saved the lives of many persons. Before quitting this subject—in which Bell may be named as a discoverer equal even with Harvey—we ought to point to one of his practical inferences from his own views, which establishes the existence of a sixth sense—that by which we attain our knowledge of distance, size, weight, form, texture, and resistance of objects. Two of his Essays, 'On the Nervous Circle,' and 'On the Eye,' have reference to this theory. The basis of it is, that the nerves of sensation play the part of reporters on the motor nerves, and indicate to the central seats of perception the condition of things within the influence of these nerves, thus forming the sixth or muscular sense.

Numerous were the hints which the genius of Bell threw out to the profession about this time, in lectures and short essays. The operation for the cure of squinting, for example, by division of the contracted muscle of the orbit, had occurred to him long before it was thought of by the German who now has the credit of the discovery, as letters before us fully prove. The existence of a vital attraction betwixt the solids and fluids of the body was also an idea of Bell, now propounded by others as new. But his discoveries on the nerves certainly established his reputation. In 1824 the London College of Surgeons offered to him their senior chair of anatomy and surgery, which he accepted; and his lectures, which were received with great applause, formed the basis of a work entitled 'Animal Mechanics,' published in 1828—1829, by the Society for the Diffusion of Useful Knowledge. Two other works, which combine high scientific knowledge with such a popularisation of the subjects as fitted them to ordinary capacities, followed soon afterwards; the one is the 'Bridgewater Treatise on the Hand,' and the other 'Illustrations of Paley's Natural Theology,' an accompaniment to Lord Brougham's work on that subject. In the mean time Bell was in the first rank of his profession, and had an ample attendance on his lectures, not only of pupils, but of men his seniors in practice. On the Continent he was even more highly estimated. Cuvier, Larrey, and other illustrious men of science, vied with one another in testifying their admiration of his talents and his labours. On the accession of William IV. he was one of those selected for the honour of knighthood with Herschel, Brewster, and others. When the London University (now University College) was established, he was offered the chair of Physiology, and he accepted the offer; but after a short period he gave in his resignation. For some time subsequently, he chiefly pursued his private professional practice, with a reputation established. He had still the same ardent desire, which the passion of his youth, to prosecute experimental siology; and, accordingly, when an offer of the Surgery in the Edinburgh University was made to accepted it, though after much doubt and reluctance. regret at quitting his London friends was great, but it overbalanced by the hope of spending his latter among those friends who had been dear to his more so by the expectation of being again placed to renew with effect his scientific studies.

Sir Charles Bell removed to Edinburgh in been absent thirty-two years. His opening Professor was brilliantly attended by professional men of eminence; and he all the high anticipations formed respecting his class. But he soon found that Edinburgh field in which he could work out his experimental either by means derived from his own exertions patronage. He had 'meditated a splendid work on the vous System,' he says in one of his letters, but he find means for its accomplishment; and the only great which he did finish was a new edition of his Expression,' largely increased and improved by his tions on an Italian journey undertaken by him in intervals betwixt his sessions at college. In the 1842 Sir Charles set out on a journey to London. reached the seat of Mr. Holland, of Hallow Park, 27th of May, where he died on the night of his arrival. death was not altogether unexpected. He had recently fered much from *angina pectoris*, a disease of some in his case. It was aggravated, there is reason to believe disappointments consequent on his settlement in and also by anxieties connected with the New form Bill, much of which he believed to be at the interests of that profession and science to which so strongly attached.

BELL-CASTING. Under BELL, P. C., have a few of the most interesting points connected tory of these instruments; under ALLOY, P. C., proportions of copper and tin contained in them; FOUNDING, P. C., the broad principles which casting of metals in general. A few details practical application of these principles to complete the subject.

The casting of common house-bells or hand-bells nowise from the processes relating to small generally; but for church-bells the case is otherwise. production of a *sonorous* quality, in addition to many which pertain to all large castings in mixed metal, casion for many scrupulous arrangements in the of the foundry. There is only one such foundry in and very few in the country generally.

A bell-foundry must have a furnace which will many tons of metal, for the whole of the casting for is made at once. In 1835, for instance, Messrs. the new Great Tom of Lincoln, intended to replace Great Tom; it weighs 12,000 pounds, being heavier than the great bell of St. Paul's Cathedral; whole of this ponderous mass of metal was melted at and in one furnace. This Great Tom, though smaller the bell of St. Paul's, is heavier, on account of its thickness.

The arrangements as to the central core or mould ing a large bell are thus made:—Contiguous to the a pit, deeper than the height of the bell. In the this pit is built up a rough mass of brickwork, smaller than the interior of the bell; and this is coated nally with a mixture of earth and horse-dung, applied cessive layers, and worked smooth by gauges until the of the core presents exactly the same size and shape as *terior* of the intended bell. When the prepared thoroughly dried by means of fires, a second coating position is laid on of the same thickness as the intended this coating, which is called the 'model,' is formed and hair, and is, like the former, brought to a very correct surface by gauges, the exact counterpart of the of the bell. A third coating is next applied, called the much thicker than the others, and formed of a ferent composition. A little tan-dust is sprinkled on the coating, or core, before the second, or model, is applied;

tter, before the outer coating, or shell, is laid
ll is well dried, the 'shell' is lifted off from the
the model is picked or cut off from the core
If we suppose the core, the model, and the shell
emispherical cups placed one within another, and
ne to be removed, it will serve to illustrate how
e comes to be formed between the core and the
hen we further bear in mind that the exterior of
s the internal form to the bell, and the interior
the external form, the object of the whole arrange-
clearly seen.

nal cavity of the mould, between the core and
that into which the metal is to be poured. The
filled up with loam or earth, to the level of the
ould; a shallow channel is cut in the loam from
to an orifice communicating with the vacant space
l; and two other orifices are left for the escape of
ed metal enters. Meanwhile the metal is being
e furnace. The tin employed is in the form of
ght from Cornwall; while the copper is old ship-
d other fragments. These are melted in a rever-
ace, by the heat of billets of wood, a kind of fuel
to the metal than either coal or coke. All being
rth which stops an orifice in the lower part of the
ocked or dug away, a narrow jet instantly pours
opening, and a stream of liquid fire (for so it
eye) runs along the channel in the loam, and
mould, bubbling and hissing, and giving forth
s. When the mould is full, the metal is allowed
perfectly cool; the loam is then removed, the
l' lifted or cut from the bell, the bell lifted off
the core pulled down. If the bell be very
occupies the pit; but if of smaller size, such as
four to ten or twelve hundredweights, six or
cast in one pit at one time.

a bell depends conjointly on the diameter and
a small bell or a thick bell giving, relatively, a
e than one which is either larger or thinner.
nder regulates the diameter and thickness ac-
musical pitch of the tone which the bell is to
this cannot be rigidly attained by casting only,
a set to form chimes) are attuned by chipping
the metal with a sharp-pointed hammer; re-
ameter at the lower edge when the tone is too
ing the thickness at the part where the ham-
en the tone is too acute.

e sheets are passing through the press, the
s announce the completion, by Messrs. Mears
el, of a bell intended for the south tower of
. It is larger than any other in the United
weight exceeding twelve tons. It is seven feet
in height, with a diameter of eight feet four
seven tons heavier than the 'Great Tom'
nd five tons heavier than the 'Old Tom' of
metal took twelve days to cool. The clapper
n three and four hundredweight. The cost is

TAL. [Bell-Casting, P. C. S.]

STE'FANO DELLA, a celebrated Italian
per, born at Florence in 1610. He worked
enth year in the shop of Orazio Vanni, a gold-
is own inclination, and some instruction he re-
ing from his master's son, Gio. Battista Vanni,
ing from Cantagallina, induced him to give
on of following the business of a goldsmith, and
rts. He accordingly applied himself to paint-
re Dandini, but he eventually adopted etching
n, being attracted by the prints of J. Callot, a
upil of Cantagallina.

ella Bella's works having attracted the notice
e' Medici, the brother of the grand-duke
t prince sent him to complete his studies in
he remained three years, and etched many
ity. After his return from Rome, he went in
e Tuscan ambassador to Paris, and remained
ears, and executed many of his best etchings,
btained a great reputation. His subjects are
animals, sea-pieces, landscapes, and ornaments.
uted with freedom, with great delicacy, and are
n, and he had a fertile and happy invention.
rin wished to retain him at Paris, and offered
on of drawing-master to Louis XIV., then a
ild. But he returned to Florence about 1647, and undertook that office to the prince Cosmo, afterwards grand-duke Cosmo III., a post which he held until his death in 1664. He was one of the best masters of the etching-needle, and has been surpassed by few in the number of his works; their number is given differently by different writers, but they probably amount to about 1500; and though he did so much, what he did he did well. Before his death he grew melancholy: his last works were six etchings of the Havoc of Death, which however he did not quite complete. There is a portrait by Della Bella in the Pitti palace of the grand-duke Cosmo III. His own portrait by Stocade has been engraved by Hollar.

One of his most valued etchings is a large view of Pont-Neuf, Paris, which, as originally issued in 1646, is very scarce.

(Gandellini, *Notizie Istoriche degl' Intagliatori*, &c.; Heineken, *Dictionnaire des Artistes*, &c.; Huber, *Manuel des Amateurs*, &c.)

BELLE'ROPHON, a genus of fossil shells, rich in species, which occur exclusively in the Palæozoic formations, is in the Silurian strata, Devonian rocks, and mountain limestone. It has been generally referred to Cephalopoda, and considered analogous to Argonauta; but D'Orbigny has given reasons for ranking it with the Heteropodous Mollusca, and comparing it with Carinaria.

BELLI'NI, VINCENZO, a modern composer, of considerable celebrity, was born in 1806, at Catania, in Sicily. His two immediate progenitors were musical men, one a Maestro di Capella rather distinguished in his own country. Bellini was educated in the Conservatorio at Naples, under Zingarelli, and in that city, before he had completed his twentieth year, he produced an opera, 'Bianca e Fernando,' at the theatre San Carlo. The following year he wrote for the Scala at Milan 'Il Pirata;' and this was succeeded by 'La Straniera' at the same, 'La Sonnambula' at Naples, 'I Capuletti ed i Montecchi' at Venice, 'Norma' at Milan, 'I Puritani' for the Théâtre Italien at Paris, &c. Having undertaken to compose a grand opera for the Académie Royale de Musique, he retired to Pateaux near Paris, under the hope of recruiting his strength for the task; but pulmonic disease had made too great progress in his frame to be arrested, and he died on the 23rd of September, 1835, within a fortnight after he had quitted the French metropolis.

Bellini's moral character stood high, and his manners and compositions were in strict accordance;—agreeable, tender, and elegant. He rarely attempted the brilliant, and never aspired to the sublime, or even the lofty. A sweetness of melody, a fitness of harmony, and an adaptation of the sound to the sense, characterise all those of his works which have come under our notice. His constitutional tendencies seem to have been adverse to that vigorous exertion of mind which in a more healthy state he might have exhibited: and (as we have elsewhere observed), we are willing to believe that had he not been cut off in almost his youth, his ambition would probably have led him to attempt something that might have secured to him the privilege of being heard in future times, for in most of his productions are traits of genius, and in none that are known to us are there any violations of good sense. He was very fortunate in his *libretti*, or dramas, and equally so in the performers for whom he wrote. The subjects he chose were interesting, and placed before the public by a body of actors and singers who were able and willing to do them every possible justice.

Sig. Bellini received the order of St. Francis from the King of Naples, and the cross of the Legion of Honour from Louis-Philippe. His remains were honoured by a grand solemnity in the church Des Invalides, and deposited in the cemetery of Père la Chaise.

BELLIS (from *bellus*, pretty), a genus of plants belonging to the natural order Compositæ, and to De Candolle's suborder Corymbiferæ, tribe Astoroideæ, subtribe Asterineæ, division Astereæ, and subdivision Bellideæ. It has a receptacle without scales, flowers of the ray ligulate, pistilliferous in one row, those of the disk hermaphrodite tubular, the involucre composed of two rows of equal obtuse scales, the receptacle conical, the fruit compressed without pappus. De Candolle enumerates five species belonging to this genus. One of them, the *B. perennis*, is the common daisy, and is a native of Great Britain and throughout Europe. It has obovate-spathulate single-ribbed crenate-dentate leaves. It is an exceedingly common plant on banks and in pastures in Europe. It blossoms nearly all the year round, and is constantly found with opened flowers from March to October. It is subject in its wild state to varieties, sometimes all the florets are found ligulate, more rarely they are all tubular. There are several varieties of the common daisy cultivated in gardens. There is a double variety called large-double, another double-quilled, and a proliferous variety known by the name of hen and chickens. These varieties assume various colours from deep red to pink and white. They are easily cultivated, and form pretty plants for edges and borders, and continue in blossom a long time.

B. sylvestris and *B. annua* are natives of Europe, but are not cultivated. The genus *Bellium* closely resembles Bellis, it differs however in possessing a pappus surrounding its fruits. The species are found in the south of Europe, and appear like small species of Bellis.

(Babington, *Manual*; Loudon, *Cyclopædia of Plants.*)

BELLOWS. [Blowing-Machines.]

BELONO'STOMUS, a genus of fossil fishes established by Agassiz. The British species (four) occur in the lias, oolite, and chalk; the foreign in the oolite of Pappenheim.

BELO'PTERA (Blainville), the shelly portion of a fossil cephalopod, intermediate between Belemnites and Sepia. It occurs in the French tertiary strata, and includes B. Cuvieri, B. compressa, and B. belemnitoidea (Blainv.). Mr. Morris adds B. anomala and B. longirostrum, from the English tertiaries.

BELOSE'PIA (Voltz). In this genus M. Voltz ranks two of the species (B. Cuvieri and B. compressa) which form part of the Beloptera of Blainville.

BEOWULF. [Saxon Language and Literature, p. 490.]

BERBERRA, or BURBURRA, is a commercial place in Africa, situated on the southern shores of the Gulf of Aden, and nearly opposite the British settlement of that name, in 10° 27′ N. lat. and 45° E. long. It is built at the head of a small inlet, which affords excellent shelter from all the prevailing winds throughout the year. The town consists of an assemblage of rude huts of various forms, round, oval, and square, generally about six or seven feet in height, built with sticks covered with mats or skins. These huts are erected in November, or as soon as the first caravan arrives, and are dismantled at the breaking up of the fair in the month of May, when the greater part of the materials are taken away. Very few persons remain on this part of the coast during the north-east monsoon, owing to the suffocating hot winds, which in June, July, and part of August, blow with great violence. The permanent inhabitants are a few Banians and some chiefs of the neighbouring tribes, who have houses of a larger size, which are divided into apartments.

The trading season commences about the end of October or beginning of November, when the first caravans from the interior arrive on the coast, and bring with them materials for constructing the huts, and immense droves of sheep, which are immediately embarked for the Mocha market before they have time to fall off in flesh, as there is no pasturage for them about Berberra. After the beginning of November caravans arrive daily, and also vessels from all the neighbouring countries. The March cafila however is the principal, and frequently consists of two thousand camels. These caravans bring ghee, coffee, sheep, myrrh, benzoin, gum Arabic, elephants' tusks, gold-dust, slaves, ostrich feathers, dry hides, and also an article called *wurs* in Arabia, which is described as something like saffron in appearance, and is used in that country as an ointment for cooling the body; it is also mixed with flour and made up in cakes, in which state it is said to be very palatable. Among the slaves are many Christians from the neighbourhood of Shoa in Abyssinia. The vessels which visit this place come from Bussorah, Muscat, Cutch, Bombay, Mangalore, Masulla, Aden, Mocha, and Jiddah: they import blue and white cotton-cloth, Indian piece-goods, European prints, silks, silk thread, shawls, red cotton-yarn called *shumlah*, beads, sugar, rice, iron, copper, wire, zinc, dates, and a few smaller articles.

The country at the back of Berberra is inhabited by the Somaulis, and affords neither pasturage nor cultivation to a distance of ten miles, the soil consisting of a coarse sand or gravel. Berberra is the harbour of Harrar, a large town in the interior, which according to some accounts is twenty days journey from Berberra, whilst others reduce the distance to five or six days' journey. It is also visited by six or seven tribes inhabiting these parts of Africa.

(Ethersey's *Information on the town of Burburra*, in the *Transactions of the Bombay Geographical Society*, vol. i.; *and Barker's Extract Report on the probable geographical*
position of Harrar, with some information on
Tribes in the Vicinity, in 'London Geographic
vol. xii.)

BERENI'CEA, a celluliferous coralline, of wh
viana is an example, fossil in the oolite of Wilts.

BERGKALK, in Geology, the German term fo
tain limestone.

BERGLER, JOSEPH, a distinguished recen
painter, born at Salzburg, in 1753. He was instr
father, and gave such early evidence of talent, th
sent, in 1776, to complete his studies in Italy, by t
bishop Cardinal Firmian of Passau. In Italy he
and fresco five years with Martin Knoller at Mila
he was acquainted with Mengs, Canova, and Gavin
and Cammacini, Tischbein, and Volpato were his co
students there, where he remained altogether six
in the interval he went to Parma, and obtained
prize of the Academy in 1784 for a picture of S
livered by Dalilah to the Philistines. He returne
many and settled in Passau in 1786, when he wa
painter to the prince-bishop Cardinal Auersperg.
stay at Passau until 1800, he painted several ex
pieces for the churches of neighbouring towns, so
have since been burnt. In 1800 Bergler was ma
of the Academy of Prague, and his ability and a
bined enabled him to educate several very able sc
still adorn the Bohemian capital with their work
himself furnished altar-pieces for many of the
Prague and its vicinity: one of his principal w
time was a large picture of Hermann and Thus
Klopstock's 'Hermannsschlacht.' He died at
1829. He had great facility of execution, but h
cellence consisted in his colouring, not so much i
tions, as in a general effective composition of colo
also etched many of his own designs with great ab

(Dlabacz, *Künstler-Lexicon für Böhmen*; Na
Allgemeines Künstler-Lexicon, in which he quote
Archiv. for 1823; Göthe, *Winckelmann und sei*
dert.)

BERGMEHL (mountain-meal), a Norwegia
in microscopic fossils. [Infusoria, Fossil, P. C.

BERNADOTTE. [John, King of Swe

BERNIER, FRANÇOIS. This 'most curi
as he is styled by our historian Gibbon, was bor
then the capital of the province of Anjou. The
birth has not been ascertained, and very little ap
known about him, until after his return from the
the first publication of his travels. Voltaire sup
was born in the year 1625. But it seems quite
that he was born eight or ten years later. He stu
cine as a profession, and after taking his degree of
Montpellier, being, as he tells us himself in the f
his book of travels, excited by the desire of seeing
he went over to Palestine and thence into Egypt.
in the year 1654. He lived more than a year at Ca
the plague, and had the rare good fortune of reco
that fearful disease. Being in Egypt, he became v
of visiting and examining the Red Sea; and, w
shores of the Red Sea, a favourable opportunity
itself for going into the East Indies. In all the
the East, a medical practitioner may travel very w
as well as the best, without any money. Bern
seems always to have been very light. He lived t
in India, and during eight of these years he resid
Delhi as physician to the great Mogul Emperor of
Aurungzebe. [Aurungzebe, P. C.] The favourite
minister of that prince, the Emir or Omrah Danie
is described as a patron of science and letters, pa
ingenious and no doubt very useful Frenchman
him along with him when he marched with an im
to the conquest of Cashmere. Bernier has left
accounts of that war, of the march of this immens
of the beautiful country which it subdued. Th
like an immense moving city. The guard of caval
of 35,000 men, and the guard of infantry of 10,0
computed that the camp contained 150,000 horses,
elephants; 50,000 camels, 50,000 oxen, and betw
and 400,000 persons. The correctness of Bernier's
of the country has been recognised and praise
European traveller that has visited Cashmere sin
Mr. George Forster, who was there in 1783 or 17
letter that 'his description of Cashmere is as li
just;' that 'Monsieur Bernier enjoyed advantages

t of few Asiatic travellers, and, happily for the
his talents amply improved them.'
France, his native country, Bernier began to
first work, entitled 'History of the last Revo-
lates of the Great Mogul,' appeared at Paris in
, in two very humble 12mo. vols. This was
Continuation of Memoirs of the Empire of the
which was published at Paris in the year 1671
mo. These works got him nicknamed 'The
books contained a vast deal of information that
new to Europe at that time, and they were
reat spirit, and with that admirable brevity and
ch distinguished many of the old French tra-
m which the modern travellers of that nation
e wholly departed. They at once made him
is, and they soon became universally known.
n reprinted, as one work, and under the altered
els of François Bernier, Doctor in Medicine
of Montpellier, containing the description of the
Great Mogul, of Hindustan, of the Kingdom of
. These travels have been rather frequently
have been translated into most European lan-
first English translation, in two volumes, 8vo.,
ot of the title-page 'London, 1672.' The trans-
glished out of French,' was not very competent
es gentils du pays' (the Gentiles or Pagans of
he renders 'the country gentry.' There is a
tion by Mr. Irving Brock, which appears to be
orrectly done. It is in two vols. 8vo., and was
ondon in the year 1826. There is a modern
of the original in 2 vols. 8vo., Paris, 1830.

avels contain much valuable history: they
uses of that important revolution which raised
the throne of Hindustan; and as the author
engaged in the scene of action, and an eye-
y of the principal events, which he relates in
d interesting language, the narrative is the
and trustworthy. Major Rennell (Memoir for
Map of Hindustan) calls Bernier 'the most
ll East India travellers.' He did not begin to
shmere until he had resided more than three
country. Besides Forster and Moorcroft, Mr.
the latest of our English travellers in that
ry, bears testimony to the accuracy of Bernier's
Mr. Vigne and two other travellers, the
n Hugel and Mr. John Henderson, who met
f Cashmere in the month of November, 1835,
ved tablet to commemorate the names of the
ellers who had previously visited the vale
ot to omit their own three names): the list was
thus:—Bernier, 1663; Forster, 1786;* Moor-
and Guthrie, 1823; M. Jaquemont, 1831;
32. Of all these European travellers into
y three, Bernier, Dr. Wolff, and Mr. Vigne,
to their native country. (*Travels in Kashmir,*
y G. T. Vigne, Esq., F.G.S., 2 vols. 8vo.,
.) M. Jaquemont, a very ingenious French
not omit to praise his old countryman, whose
yle he would have done well to imitate.

was what some call the golden age of Louis
does not appear to have tasted of the patronage
the court. It should seem that he depended
hospitality of Madame de la Sablière, who was,
her Ninon de Lenclos, but who had the merit
e poverty and helplessness of the exquisite
Bernier is also said to have had *des liaisons*
ith Ninon de Lenclos herself. In the house
adies, or these two French Aspasias, he met
wits and savants of the day, as St. Evremond,
ntaine, Fontenelle, &c. Bernier was made to
, but that artificial Parisian society appears to
n, or to have deprived him of his simplicity.
said of him that, from his countenance, his
nners and conversation, he deserved to be called
ophe' (the pretty or charming philosopher).
cal treatises have long been neglected or for-
said that he took to writing them for the
amusement of Madame de la Sablière, who
metry, astronomy, and the natural sciences, as
elles-lettres. Gassendi's philosophy was then
his works were rather too difficult and too voluminous for ladies and wits. In 1674-5 Bernier published an abridgment of the philosophy of Gassendi. In the second part of this abridgment he treats of the systems of Ptolemy, Copernicus, and Tycho Brahe, and gives a refutation of judiciary astronomy. (In the Lyon edition, which is the only one we have seen, the whole of this abridgment of Gassendi fills 8 vols. 12mo.) This work was much read or very much praised at the time. He wrote a memoir on the quietism of the Indians, which was inserted in the 'Histoire des Ouvrages des Savants,' 1688. His other things seem mostly mere jeux-d'esprit. His jokes against the Aristotelian philosophy ('Ariet donné en la grande chambre du Parnasse pour le maintien de la philosophie d'Aristote') are given in the 'Menagiana.' Boileau is said to have assisted in this joke. In 1682 Bernier published 'Doubts of Bernier on some of the principal chapters of his Abridgment of the Philosophy of Gassendi' (Paris, 1 vol. 12mo., 1682). The copy of this volume in the Library of the British Museum has at the bottom of the title-page, apparently in Bernier's handwriting, 'à Monsieur Bayle.' Bayle had good-humouredly exposed a somewhat laughable mistake which Bernier had committed in translating from Gassendi's Latin; but he had also cited Bernier as a traveller with commendation. (Bayle, *Dictionnaire Historique*, &c.) He also wrote a treatise on Free-will, 'Traité du Libre et du Volontaire,' which was published at Amsterdam, in 1685. In his 'Etrennes à Madame de la Sablière,' writing again in his natural manner as a traveller, he gives a charming description of the grand canal of Languedoc. Bernier's moral philosophy, in his latter years, was that mixed epicurism and scepticism which was then becoming fashionable at Paris, and which has since had so very long a reign in France. He declared that he doubted of his own philosophy and of all philosophies, and that after philosophizing for thirty or forty years he knew not what to make of it. According to St. Evremond, in a letter addressed to Ninon de Lenclos, Bernier said to him one day, in confidence, that he thought that abstinence from sensual pleasures was a great sin. St. Evremond and his friends of both sexes very practically illustrated that they believed in Bernier's theory. Bernier visited England in 1685, and died at Paris on the 22nd of September, 1688. It is reported of him, by Racine the younger, that his death was caused by a stroke of cutting raillery, made at a dinner party by the president D'Harlay, and that the old epicurean died of a broken heart. But these stories are very doubtful.

(*Biographie Universelle*; Bernier's own Works and Prefaces: Gibbon; and the other authors cited in the article.)

BERVIC, CHARLES CLEMENT BALVAY, the most distinguished engraver of France during the French revolution, was born at Paris in 1756. He was the pupil of J. G. Wille, and in 1784 was elected a member of the French academy of painting. A large full-length portrait of Louis XVI. which he engraved in 1790, from the picture by Callet, is one of the finest engravings that has ever been produced. It is distinguished for excellent drawing, extreme softness of tone, and a true effect of colour, but is rather defective in force. It is entitled 'Louis XVI., Roi des François, Restaurateur de la liberté, présenté au Roi et à l'Assemblée Nationale.' After the execution of the king, Bervic, wishing to escape suspicion, and at the same time preserve the plate, cut it in half, thus attaining both objects. The half plates were reunited after the restoration, and beautiful impressions were again taken from it; but the earlier impressions are much more valued, and command very high prices. Müller of Stuttgard engraved the same picture.

Other masterpieces of Bervic's graver are the Rape of Deianira, and the Education of Achilles, after Guido and Regnault; La Demande Acceptée, and Le Repos, after Lépicié; and the antient group of the Laocoon, an admirable production.

Through a weakness he was some years before his death forced to give up the practice of engraving, and he confined himself to teaching engraving. He died in 1822. He was a member of the French Institute, and Chevalier of the order of St. Michel, of the Légion d'Honneur, and of the Réunion.

(Huber, *Manuel des Amateurs*, &c.; Bartsch, *Peintre-Graveur*; Joubert, *Manuel de l'Amateur d'Estampes*; Gabet, *Dictionnaire des Artistes*, &c.)

BERYX, a genus of fossil fishes of the family Percoideæ (Agassiz). B. ornatus occurs in the chalk of Sussex. Mantell figured it, under the title of Zeus Lewesiensis, in the 'Geology of Sussex.' Two other species occur in the British chalk.

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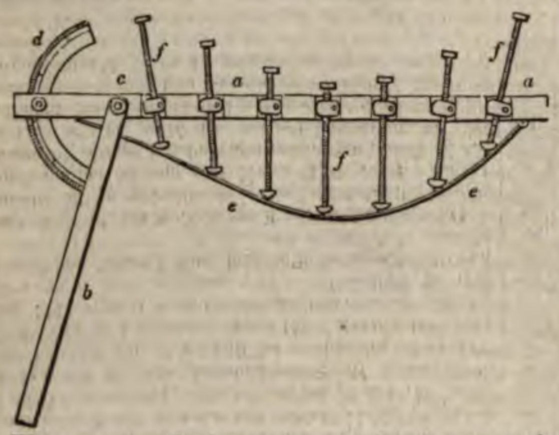
his two friends appear to have made a mistake in this date;
the years 1783 and 1784.

BEVEL, or BEVIL, is, according to Nicholson's 'Architectural Dictionary,' the name applied both to the oblique angle formed by two surfaces which meet at either more or less than a right angle, and to the instrument employed by carpenters and joiners for taking and transferring such angles. The common carpenter's bevel consists of a straight wooden stock, mortised at one end to receive a thin blade, which is usually formed of steel, and attached to the stock by a pin in such a way that it may be turned to any required angle, and secured by a tightening screw. This kind of bevel may be described as an adjustible T-rule, the transom of which may be placed at any required angle with the stock. In some cases the pin or pivot which connects the blade with the stock passes through a slot or long opening in the blade or transom, so that its arms may be made of unequal length. Hebert describes, in the 'Engineer's and Mechanic's Encyclopædia,' vol. i. p. 165, an instrument of the bevel kind for gauging, and transferring to work or paper, an oblique angle of which one side is curved, consisting of two rulers, *a* and *b*, pivoted together at *c*, and capable of being set to any angle by means of the brass arc *d*, which is attached firmly to the ruler *b*, and passes through a mortise or slit in *a*, in which it may be secured at any point by means of a binding screw. The adaptation of the instrument to a curved surface is provided for by a flexible blade or riband of steel *e*, secured to the ruler *a* at one end, but capable of being made to assume and retain any simple curve by means of the series of screws marked *f f*, which pass through nuts or mortises attached to the ruler *a*, and press against the steel riband by a kind of swivel joint which provides for the various angles of contact formed by the riband and the screws.



Where many articles have to be worked to the same angle, it is desirable to use a fixed bevel, made to the required angle, especially where one or both of the limbs are curved. When the interior angle of the bevel is that used by the workman, such an instrument is sometimes called a *joint-hook*: a familiar instance of its use in this way is in working the intradoses and radiating beds of arch-stones, which, for circular arches, will be alike in every part of the arch.

BEWICK, THOMAS, justly called the reviver of wood-engraving, was born at Cherryburn, near Newcastle-upon-Tyne, in 1753. He evinced an ability to draw from his infancy, and was accordingly, at the usual age, apprenticed to Ralph Beilby, an engraver of Newcastle, who had some reputation in that city. Dr. (then Mr.) Hutton consulted Beilby upon the best method of engraving the diagrams to his treatise on Mensuration; the engraver strongly recommended that they should be cut in wood, for various reasons, and by Thomas Bewick. Accordingly, in 1770, the work appeared, with complete success; and was followed by several other mathematical works.

Bewick now attempted works of much higher pretensions. He designed a set of illustrations to Gay's Fables, and for one of the cuts, the 'Old Hound,' he obtained, in 1775, a premium for the best wood engraving offered by the Society of Arts. The work was published in 1779. In 1784 Mr. Saint published a set of 'Select Fables,' with cuts by Bewick. After these works he commenced, in partnership with his old master Mr. Beilby, to prepare a 'General History of Quadrupeds,' which was completed in 1790, went through several editions, and obtained Bewick a great reputation. The designs in this work are by Bewick and his brother John, who was his pupil; and they are all executed with great natural truth, and in a free correct manner. The cuts themsel
rior to anything that was ever done in the same
and are inferior only to the best cuts of the pr
mechanical execution and clearness of line. As
they still have the advantage. His History of
was followed, in 1795, by Goldsmith's 'Traveller
serted Village,' Parnell's 'Hermit,' and Somervill
The 'Chase' was the last work in which Thomas
by his brother; all the cuts were executed by T
the designs were by John. John Bewick died
tion in 1795, aged 35. In 1797 Thomas pu
'History of British Birds,' which is his best ser
birds are superior to his quadrupeds. This is
work he undertook in partnership with Mr. Beil
dissolved partnership during its progress.

Bewick had a numerous school, and was latterly
cupied in teaching; and in his last works was gre
by his son Robert and other able pupils, of whom
Clennel have since particularly distinguished the
the same line of art.

The most considerable of Bewick's latest works
Fables of Æsop and others,' and his 'British Fi
very last work was a cut of an old horse, for the
paper against cruelty to animals. He died in 182
and is said to have left a very full autobiography
which is written with great simplicity. His ma
considered a large cut of a bull of the antient
breed, from Chillingham Park; a proof of this cu
is worth about 20 guineas. Bewick's services ar
cussed in 'The History of Wood Engraving, with
by J. Jackson;' and there is a memoir of him, of
detail, in the 'Gentleman's Magazine' of 1829.

BIDENS, a genus of plants belonging the na
Compositæ, the suborder Corymbiferæ, tribe Se
subtribe Heliantheæ, division Bidentideæ. It
gamous discoidal heads sometimes radiant; the flo
ray neuter ligulate, of the disk, hermaphrodite, t
receptacle flat; the involucre of two rows, the
spreading; the branches of the style surmounte
cones; the fruit compressed, angular, rough at
the angles terminating in 2-5 stiff retrorsely h
The genus has been named Bidens from the tw
most frequently surmount the teeth. A grea
species belonging to this genus have been describ
are generally inconspicuous weeds. They have
in Europe and North and South America. Two
of Great Britain in marshy and watery places. B
and *B. cernua*. The latter is the Cereopsis Bidens

(Babington, *Manual*; Lindley, *Natural System*

BIGBONE LICK, a place in Kentucky (U.
great numbers of fossil mammalia occur in a d
marshy soil, covered by gravel and resting on blue
bones of Elephas primigeneius and Mastodon m
very numerous. With them lie bones of Megalo
sonii, Bos bombifrons, Bos Pallasii, and Cervus A

(Rogers, *On American Geology*; *Brit. Assoc.*
1834.)

BIGNO'NIA, a genus of plants named by Tou
the Abbé Bignon, librarian to Louis XIV. It for
of the monopetalous order of Exogens, Bignoniac
campanulate 5-toothed rarely entire calyx; the co
short tube, a campanulate throat, and a 5-lobed bil
the stamens four, didynamous, with the rudiment
lobes of the anther divaricate; stigma bilamellat
siliqui-formed, 2-celled, with the dissepiment paral
valves; the seeds in two rows, imbricate, transverse
branous wings. Nearly one hundred species of th
elegant plants have been described. They are us
ing shrubs furnished with tendrils, with opposite,
jugate, ternate, pinnate, or digitate leaves. The
mostly in terminal or axillary panicles. The
trumpet-shaped, and are coloured variously, wh
orange, purple, violet, or rose.

All the species of this genus are splendid pla
blossom, and deserve a place in every collection. M
are climbers, and adapted for training up rafters an
they only grow freely in stoves. A mixture of lo
is best adapted for their growth, and cuttings
readily under a hand-glass in heat, either in mou
The species known by the name of this genus wh
abundant in our gardens is the *Bignonia radicans*.
some other species of Bignonia are now referred t
Spathodea [SPATHODEA, P. C. S.] and Tecoma

is one of the few species capable of living in
ainst a wall in this country.

alis, has square glabrous branches, glabrous
es, oblong lanceolate leaflets, simple axillary
vered peduncles, terminal ones racemose, fol-
It is a native of Guiana and the island of
It is applied by the negroes to swellings of
which they are troubled.

on is a tree, and has quinate leaves; ovate-lan-
ate, glabrous leaflets; terminal, solitary or twin
plant is a native of Jamaica, on the banks of
s white flowers, not unlike those of *Datura*
which come out before the leaves. The wood is
fellow colour, and is sometimes brought into
ler the name of ebony. It is said to be an anti-
son of manchineel.

a climbing plant, and has abruptly bipinnate
ate elliptic-ovate, acuminate, deeply cordate, gla-
axillary pendulous panicles. It grows on the
Drinoco. A red matter is extracted from its
ndians, with which they paint their bodies. It
and some has been used in this country as a dye.
has tetragonal branches, conjugate leaves, cori-
leaflets, simple tendrils, axillary 5-flowered
toothed calyx. It is a native of Guiana and
es. It has large white flowers, and is distin-
ll the other species by its peculiar garlic odour;
ch name *liane à l'ail.*

ener's Dictionary; De Candolle, *Prodromus;*
nes; Cyclopædia of Plants.)

YK, WILLEM, ranked by his countrymen
t—by some as the very first modern poet and
nd, and also distinguished by his varied erudi-
at Amsterdam in 1756. His studies at Leyden
ensive range, for besides philosophy and lan-
of the modern languages included—he applied
ry, archæology, jurisprudence, divinity, medi-
gy; and appears, in short, to have left scarcely
cience untouched. If there seems to be some-
rvellous in this account of his studies at so
is not lessened by their being of a kind to in-
the laborious scholar than of the poetical enthu-
in the character of poet however that he made
776, when his 'Invloed der Dichtkunst,' &c.
ce of Poetry on States and Governments'),
rize from the Leyden Society of *Kunst door*
subject was hardly one which a youthful poet
ected for himself, though one for which Bil-
ave been better prepared than most others.
breaks forth urged on by inspiration of a dif-
m that produced by the hope of obtaining pre-
ze-medals; and if Bilderdyk's did not, it was
e degree a foreboding of his future career,
be confessed, was rather too much in accord-
otto of his first Leyden patrons—'Kunst door
rt through Industry,' since, though his produc-
great industry, ability, and superior mastery of
rely soars into the more elevated regions of

n the 'Love of Fatherland' obtained him a
he following year; and in 1779 he published
of the 'Œdipus Tyrannus' of Sophocles, in-
oit to his countrymen the genuine form and
dramatic poetry, in opposition to the spurious
French models, by a servile imitation of which
ated both their language and their taste. About
to practise at the bar at the Hague, yet with-
his literary occupations, for it was about the
in conjunction with Feith, he undertook not
it and illustrate with an historical commentary
Geuzen' [Netherlands, P. C., p. 161], but
work itself by dressing it up in more poetical
tment not a little singular for a contemporary
se author was just dead. Thus renovated, the
ared in 1784; and not very long afterwards
t took place between Bilderdyk and Feith in
differences of political opinion, the former
to the House of Orange, the other to the
ty. Towards the end of 1786 the unsettled
affairs induced Bilderdyk to quit Holland and
in Germany, where he supported himself by
e did subsequently in England. This self-
asted nearly twenty years, during the first half
of which his muse was silent. It was not till 1799 that he produced two volumes of miscellaneous pieces entitled 'Mengelpoesie,' containing a poem on astronomy and some translations from Ossian. In 1803 first appeared his 'Buitenleven,' or 'Rural Life,' which is considered by some almost as his masterpiece; yet, great as are its intrinsic merit and its excellence of execution, it has no claim to originality, being no more than a free and spirited imitation of Delille's 'L'Homme des Champs.' The same may be said of a subsequent translation by him of the whole of 'Fingal.' On his return to Holland he was received as one whom the nation had reason to be proud of, and was taken into favour by Louis Napoleon (then just made King of Holland), who was desirous of rendering himself popular with his new subjects, and appointed Bilderdyk not only his instructor in the Dutch language, but also president of the Institute founded by him at Amsterdam, upon the model of the French one. He was thus all at once placed in comparatively prosperous circumstances, and his literary reputation was not a little increased also by his 'Ziekte der Geleerden' (the Maladies of Literary Men), a subject equally repulsive and unpoetical, but so treated as to be of powerful though painful interest. He next attempted tragedy, and produced several pieces of the kind, which, although unsuccessful upon the stage, are marked by great poetical beauties. They were published in 1803, in three volumes, and among them are two by his wife, viz. 'Elfrida,' and 'Iphigenia in Aulis.' In 1809 he was thrown into great affliction by the loss of several of his children, and in the following year the abdication of Louis Napoleon deprived him of his pension, and he was again in very embarrassed circumstances, and so continued till the return of the Prince of Orange, when they began to improve. A year or two afterwards he removed to Leyden, where, as he had done all along, he continued to put forth one new production of his muse after another. The noblest of them all however, his 'Ondergang der Eerste Wereld,' or 'Destruction of the First World,' did not appear till a later period. So far from betraying any decline of intellectual power, this fine poem displays more of imagination and invention than any of his former ones, and had it been completed, it could hardly have failed to place the name of Bilderdyk beside those of Milton and Klopstock, but unfortunately he proceeded no further than with five books of it. On the 16th of April he lost his second wife, Catherina Wilhelmina, a lady of considerable literary attainments: besides the tragedies already mentioned, she wrote, among other things, a poem on the battle of Waterloo, and translated Southey's 'Roderic.' Bilderdyk did not survive her very long, for he died at Haarlem in the following year, December 18, at the age of seventy-five. Among the numerous MSS. he left behind him was a history of Holland, which has since been edited by Tydemann.

BILL CHAMBER, a department of the Court of Session in Scotland, in which one of the judges officiates at all times during session and vacation. The youngest judge is lord ordinary on the bills during session; the duty is performed by the other judges, with the exception of the two presidents, by weekly rotation during vacation. All proceedings for summary remedies, or for protection against impending proceedings, commence in the Bill Chamber—such as interdicts (or injunctions against courts exceeding their jurisdiction), a procedure which frequently occurred during the recent discussion in the Church of Scotland as to the veto question; suspensions of execution against the property or person, &c. The process of sequestration or bankruptcy issues from this department of the court. By far the greater number of the proceedings are sanctioned by the judge as a matter of form, on the clerks finding that the papers presented ask the usual powers in the usual manner; but where a question of law is involved in the application, it comes into the Court of Session, and is discussed as an ordinary action. The Lord Ordinary on the bills is the representative of the court during vacation. A considerable proportion of his duties are regulated by 1 & 2 Vict. c. 86.

BILL OF EXCHANGE. The general law on the subject is the same in Scotland as in England, with few exceptions. In Scotland it is not held that to make a bill negotiable, it must contain negotiable words. The laws restricting the negotiation of bills under 5*l*. do not apply to that part of the country. It is usual, there, to protest both foreign and inland bills, both for non-acceptance and non-payment. When protest has been duly taken and recorded, and when the other requisites of negotiation are complied with, and there is no flaw on the face of the bill, it may be executed immediately against the parties liable, by 'summary diligence,' as if it were the decree of a court.

BILL IN EQUITY. [Pleading, P. C.]

BILL IN PARLIAMENT. [Parliament, P. C.]

BILLARDIE'RA, a genus of plants named after Jean Jacques Julien Labillardière, a French botanist, who visited Syria, and afterwards New Holland, in D'Entrecasteaux's expedition, and wrote the 'Novæ Hollandiæ Plantarum Specimen,' in two volumes, 4to. The genus belongs to the natural order Pittosporaceæ, and has a calyx of 5 acuminate sepals, 5 petals with approximate claws, which are convoluted at their edges, forming a campanulate flower; an elliptical berry terminated by a style. The species are called Appleberries; and George Don enumerates eight. They are climbing shrubs, natives of New Holland and Van Diemen's Land. The fruit which they bear is eatable.

B. longiflora has climbing branches, the younger ones scarcely pubescent; the leaves lanceolate, entire; the pedicels 1-flowered, glabrous, one half shorter than the flower; the berries almost globose, torose, glabrous. This plant is 'a fast grower and abundant flowerer; and when in fruit its fine blue berries make a handsome appearance.' (Loudon.)

The other species are desirable shrubs for the conservatory. They thrive well when planted in an equal mixture of loam and peat. Cuttings will readily root in sand under a bell-glass. They may be also raised from seed, which they produce in abundance.

(*Cyclopædia of Plants*; G. Don, *Gardener's Dictionary*.)

BILOCULI'NA. [Foraminifera, Fossil, P. C. S.]

BINCK, JACOB, a celebrated old German engraver and painter, and one of the so-called little masters, was born about 1500, in Cologne; some authorities make him, incorrectly, a native of Nürnberg. He at all events lived some time in Nürnberg, and was probably the pupil of Albert Dürer. Sandrart says he studied with Marcantonio at Rome; all the accounts of him, however, are little better than conjectures. In 1546 Binck appears to have been living at Copenhagen as portrait painter to Christian VIII. of Denmark. Later he was living at Königsberg in the service of Duke Albert of Prussia, who sent him in 1549 on a commission to the Netherlands. In 1550 he was employed again by Christian VIII., to select a fit spot for the erection of a fortress in Holstein. He probably died at Königsberg, in the service of Albert of Prussia, about 1560.

Bartsch describes ninety-eight prints by Binck, including one woodcut. There are many other prints attributed to him, which are marked J. B., but these according to Bartsch belong to some other artist, who probably is the same who studied, according to Sandrart's account, at Rome. Binck's monogram is made of J. C. and B. intermingled, the C signifying Coloniensis, 'of Cologne:' in one print the word Coloniensis is written in full. Many of his prints have been copied, with a view to profit by the deception, as is the case with the works of other celebrated masters. Binck's drawing is superior to that of the little masters generally, but his style is very similar to that of Barthel Beham.

The initials J. B. answer to several of Binck's contemporaries, as Johann Burgmair, Joachim Brechtel, Jacob Beutler, Johann Brosamer, and Julio Bonasone. His monogram is also very like that of Hans Baldung, the difference being only that between a G. and a C., both generally indistinctly expressed. Binck's works, according to the collection of Mariette, amount to 200; their subjects are various.

(Heineken, *Dictionnaire des Artistes*, &c.; Huber, *Manuel des Amateurs*, &c.; Meusel, *Neue Miscellaneen Artistischen Inhalts*, No. 8; Bartsch, *Peintre-Graveur;* Brulliot, *Dictionnaire des Monogrammes*, &c.)

BINOMIAL EQUATION. [Equation, Binomial, P. C. S.]

BIRD, JOHN, a celebrated mathematical instrument maker in the last century, died March 31, 1776, aged sixty-seven years. He 'was brought up a cloth-weaver in the county of Durham. What first occasioned him to turn his thoughts to the art, in which he afterwards so much excelled, was his accidentally observing, in a clockmaker's shop, the coarse and irregular divisions of the minutes and seconds on a clock dial-plate. These offended him much. He divided another plate with great neatness and accuracy, and amused himself for some time with dividing and engraving dial-plates for the clockmaker. He engraved all the figures upon his own instruments. He came to London in the year 1740, and certainly was in business for himself in the year 1745.' (Ludlam, in work presently cited, Preface.)

Bird began his career in London by dividing astr instruments both for Graham and Sisson; and a carried on business in the Strand. His celebrated G quadrant, of eight feet radius, was mounted February and was used both by Bradley and Maskelyne. instrument was erected at Oxford Observatory. His was the mural quadrant for the Ecole Militaire at Pa which D'Agelet and the two La Landes determine clinations of 50,000 stars. The Greenwich Quad described by Lemonnier in his *Description et U* Paris, 1774. In 1767 he received 500*l.* from the sioners of longitude, on condition that he should apprentice, instruct other persons as required, and upon oath, descriptions and plates of his methods were published by the commissioners aforesaid, unde lowing titles :—'The method of dividing astronomic ments,' &c., 1767; 'The method of constructing m drants, exemplified by a description of the brass mura at the Royal Observatory at Greenwich,' &c., 1768.

In 1786, Mr. Ludlam, of St. John's, Cambridge, one of the persons appointed by the commissioners Bird's methods, published his 'Introduction and Not Bird's Method of Dividing, &c.' This treatise had to Bird, and bears his certified attestation of its c This attestation is a model of sulky assent, as 'When I wrote my tract on the constructing and astronomical instruments, I thought I expressed m to be understood by any common workman a littl this business. What difficulties the *learned* may I know not; if my friend can satisfy their scruples the better. All I can say is, that he has nowher my meaning; and if he can (by what he has writ those understand my method of dividing who other not, he will not lose his labor.—John Bird.'

The explanation of the improvements on Grahan of dividing, which has made the name of Bird throughout the astronomical world, has been give duation, P. C.

BIRD, EDWARD, R.A., an excellent Eng painter, was born at Wolverhampton in 1772. As a strong inclination for drawing, his father, who was apprenticed him to a tea-board manufacturer of Bi with whom it was Bird's business to paint the boa labours in this way were highly profitable to his who wished to retain Bird in his service after the of the term of his indentures, but Bird preferred fortunes in the world as an artist, and he accordi as a drawing-master at Bristol. In 1807, when he thirty-fifth year, he exhibited some paintings at B were much admired, and sold for thirty guineas eac were succeeded by a piece called Good News, w blished his reputation. Other good works suc the Choristers Rehearsing, and the Will; the purchased by William IV., the second by the M Hastings, and the Royal Academy elected Bird an cian. He now exhibited his masterpiece, the Field Chase the Day after the Battle, which was purchas Marquis of Stafford for 300 guineas. The same purchased his next picture, the Death of Eli, for 50 and he obtained by it also a prize of 300 guineas a the British Institution. The picture however wa artist's: it was the joint-stock property of three ge Bristol, who had commissioned Bird to paint it fo neas, and the 500 for which the picture sold at the was divided among them. The profitable result of culation led them to give Bird a second commissio painter declined their further patronage.

In 1813 Bird was in London, and was introduc Princess Charlotte, at Warwick House, by his fr Murphy, to whom the Princess said—'Mr. Bird well-bred man—he has a natural politeness about h appointed him her painter, and he presented the pri the Surrender of Calais, one of his favourite pictur visit to London produced a great change in his tast no longer satisfied with the humble character of his jects; he accordingly forsook the truths and beauti and domestic life, in pursuit of the imaginary great ligious and historical subjects—the Fortitude of Death of Sapphira, the Crucifixion, and the B Ridley and Latimer, and even the Embarkation XVIII. for France, which at most could be but show. This last undertaking was a great misfortun he required the portraits of many persons of rank,

he prevailing upon these persons to sit was a trouble
iculty which Bird had never contemplated. He
failed in his attempt, and this disappointment
ad some share in hastening his death. He died in
is forty-eighth year, leaving his pageant unfinished.
nay serve as a warning to future artists who leave
of nature, simplicity, and truth, to picture the empty
f state ceremonies.

kind of picture by which he gained his popularity,
ed several which have not been mentioned—as the
h's Shop, the Country Auction, the Gipsy Boy,
Recruit, Meg Merrilies, the Game at Put, and
earliest works, as the Village Politicians, and the
n six scenes.

ds the close of his life,' says Allan Cunningham,
oks grew dark and melancholy; but this was less
f his mind than of his fortune; he felt that the
fashion which he had worshipped was making its
—neglecting while it praised, and spurning while
him.'

buried with all the honours of the city in the clois-
tol Cathedral. Three hundred gentlemen followed
the grave: his son, a child of seven years of age,
hief mourner. The expense of the funeral was
is widow, a singular instance of illiberality on the
mourners, if, as reported, the funeral was made
their express desire, and against the inclination of

Another version however states that Mrs. Bird
took upon herself the expense, and declined the
stance of the gentlemen who attended the funeral.
gham, *Lives of the most eminent British Paint-*

(or Byrde, or Bird), WILLIAM, who is num-
ng the most celebrated of our ecclesiastical com-
born about the year 1540, and educated as one of
en' in the chapel of Edward VI., probably under
s Thomas Tallis,' whose pupil he certainly was at
riod of his life. In 1563 he was chosen organist
Cathedral, and in 1575, conjointly with Tallis, be-
ist to Queen Elizabeth, as well as gentleman of her
e died in 1623. Birde seems to have been highly
oth in his private and professional capacity. Pea-
his 'Complete Gentleman,' speaks of him with
ence, as does his pupil Morley, in his 'Introduc-
rney's *Hist.* iii. 83.) That he was great in his
e however when that art exhibited more of study
, his compositions afford indisputable evidence.
te Service, together with three Full Anthems,
Boyce's 'Collection,' prove his musical learning,
ther evinced in his 'Cantiones Sacræ,' or sacred
ny voices, printed, under letters-patent from Queen
n junction with his master Tallis [Tallis, P. C.],
republished by the 'Society of Musical Antiqua-
also contributed largely to 'Queen Elizabeth's
ok,' 'a magnificent folio manuscript curiously
d morocco,' now in the British Museum, containing
ty pieces for the organ and virginal. [Virginal,
mong these are 'The Carman's Whistle,' an air
ons by Birde, which, if actually and well executed
gin queen,' shows that her majesty was as com-
ress of her instrument as of her bishops. Indeed,
this, even in the present day, puts the skill of a
to a somewhat severe test. He also published
, chiefly with Latin words—for it is conjectured
not a very sincere adherent to the Reformed reli-
f them displaying deep study, and a profound
of florid counterpoint. But he is now generally
in fact, well known everywhere—by his canon
, Domine,' a unique composition, which has rather
lost by the operation of time, formed as it is of ma-
during, that in spite of the love of novelty, which
so influential, it has maintained its ground during
centuries and a half. Some attempts have been
o time made, particularly on the Continent, to tear
a leaf from Birde's laurels, but he is still left in
ion of this, his richest, never-fading ornament.

ECK, GEORGE, M.D., was born January 10,
ettle, in Yorkshire, where his father was a merchant
. At the age of eight he was sent to school at the
ewton, Lancashire, where he remained till fourteen,
as placed with Mr. Dawson of Sedbergh, a man of
e mathematical attainments, who had once been a
and he read the classics with a relative, Mr. Robert
Foster. He displayed an early predilection for mechanical and scientific subjects, which led him to select the medical profession as his pursuit. He commenced his medical studies at Leeds, and at the age of eighteen repaired to Edinburgh, where he remained one session, and the following winter became a pupil of Dr. Baillie in London; but at its close he again went to Edinburgh, and at the termination of his fourth session took his degree. His reputation in the university was already considerable, and he had formed a friendship with Brougham, Jeffrey, Sidney Smith, F. Horner, and others who afterwards attained eminence. While at Edinburgh he was put in nomination for the professorship of the Andersonian Institution at Glasgow, and his election was carried by a considerable majority. In November, 1799, he commenced his first course of lectures at Glasgow on Natural and Experimental Philosophy. There was at that time no maker of philosophical instruments at Glasgow, and he was obliged to have his philosophical apparatus made by ordinary workmen. He had employed a tinman to construct a model of a centrifugal pump; and it was in the cellar which formed the workshop, while surrounded by the workmen who had made it, but were ignorant of its use, that he was first struck with the idea of giving a gratuitous course of lectures for the scientific instruction of the mechanics of Glasgow. In March, 1800, he communicated his wishes on this subject to the trustees of the Andersonian Institution, who regarded the proposal as visionary, and nothing was done during the session. At its close Dr. Birkbeck returned to Yorkshire, and in preparing the prospectus of his courses for the ensuing session, he announced his intention of establishing a class 'solely for persons engaged in the practical exercise of the mechanical arts, men whose education in early life has precluded even the possibility of acquiring the smallest portion of scientific knowledge.' In the style of these lectures he promised that he would study 'simplicity of expression and familiarity of illustration.' On his return to Glasgow a printed invitation was circulated in the different manufactories, which contained an offer of tickets for the admission of the most intelligent workmen in each manufactory into the mechanics' class at the Andersonian Institution. The number who accepted this offer was not large, and the first lecture was attended by only seventy-five persons; but it gave so much satisfaction, and excited such general interest, that at the second lecture the number was increased to two hundred; at the third lecture above three hundred mechanics were present; and at the fourth above five hundred; and as the theatre of the Institution would not accommodate many more persons, it became necessary to limit the number of tickets. At the close of the course his class of mechanics presented him with a silver cup. Dr. Birkbeck continued his lectures to them for the two succeeding seasons; and in 1804 he relinquished the professorship, and was succeeded by Dr. Ure.

In May, 1806, Dr. Birkbeck married a lady named Lloyd, the daughter of Samuel Lloyd, Esq., of The Farm, near Birmingham, and settled in London, where he soon obtained a good practice as a physician. In March, 1807, his wife died, and he did not marry again until 1817, when he was united to the youngest daughter of Henry Gardner, Esq., of Liverpool.

While in active practice in London as a physician, Dr. Birkbeck had few opportunities of following up the labours which he had commenced at Glasgow for the advancement of scientific knowledge amongst artisans; but it was a subject which he had always at heart. In 1820 he gave a gratuitous course of seventeen lectures at the London Institution. In February, 1823, the mechanics of Glasgow who attended the lectures at the Andersonian Institution, as a mark of respect for his character, and in gratitude to him as the 'liberal-minded projector and founder' of the mechanics' class, asked his consent to allow his portrait to be taken. In July of the same year they resolved to establish a school for their own instruction, to be called the Glasgow Mechanics' Institution. Many circumstances now tended to a general development of Dr. Birkbeck's favourite plans. In 1821 a School of Arts had been established at Edinburgh, through the exertions principally of Mr. Leonard Horner. In the 'Mechanics' Magazine' for October 11, 1823, a paper appeared, entitled 'Proposals for a London Mechanics' Institute.' Dr. Birkbeck was at this time engaged in preparing an Essay on the Scientific Education of the Working Classes, and he wrote to the 'Mechanics' Magazine' (of October 18th), offering information and every assistance in his power in the formation of the projected institution. He was soon actively engaged in this object, and on the 11th of November, 1823, presided at a public meeting at the Crown and Anchor, which was attended, amongst others, by Dr. Lushington, Jeremy Bentham, David Wilkie, and Cobbett: Lord Brougham, who had attended the preliminary meetings, was absent from other engagements. The question of enabling persons engaged in the mechanical arts to acquire scientific knowledge was now fully brought before the public in London; and after another meeting, on the 2nd of December, the first officers of the 'London Mechanics' Institution' were appointed on the 15th of December. Dr. Birkbeck was elected president, which office he filled till his death; and his son has since been annually elected to the same post. At the formation of the institution Dr. Birkbeck generously lent the sum of 3700*l*., for the purpose of building a lecture-room, &c. On the 20th of February, 1824, he delivered an inaugural address on the opening of the institution, which was followed by a lecture by Professor Millington.

Dr. Birkbeck's professional and scientific pursuits, and his services in various ways, in connection with objects of public utility, were continued to the last. He died December 1, 1841, at his residence in Finsbury Square, London, of a severe internal disease which occasioned great suffering. He left a son by his first wife, and two sons and two daughters by his second wife, who survived him. His funeral was attended by a large procession of the working classes, the members of the Mechanics' Institute and other societies, the committee of the Polish refugees and a number of Poles; and among the private carriages was that of the Turkish ambassador. Altogether about a thousand persons were present. The writer of a notice of Dr. Birkbeck in the 'Gentleman's Magazine,' February, 1842, has the following remarks on his character and personal appearance:—'He was mild and equable in his temper and disposition, benevolent in spirit, and possessing great suavity of manners. He spoke with singular neatness and fluency; and his ideas were as clear as his language. Whenever he appeared among the mechanics he was welcomed as a father and a friend; he was highly appreciated by a very large circle of private friends, and was held in great esteem by the most eminent public and literary and scientific men of the day. As a politician, he belonged to the Whig school. He possessed a reflective, beneficent countenance, a venerable and very unpretending aspect.'

(*Mechanics' Magazine*, vol. i., 1823; *London Mechanics' Register*, vol. i., 1825.)

In April, 1842, a meeting of the friends and admirers of Dr. Birkbeck was held at the Freemasons' Tavern, London, for the purpose of adopting some plan of testifying the public gratitude to his memory for his long and active services. Lord Brougham took the chair; the Bishop of Ripon, Lord John Russell, and many other eminent friends of the diffusion of knowledge were present, and a resolution was passed in favour of founding by subscription, in University College, London, a Birkbeck professorship of machinery and manufactures, including the application of chemistry and other branches of natural philosophy to the arts; and that it should be incumbent on the professor to lecture in the country in vacation. This professorship has not yet been established.

BIRKENHEAD, a town on the Cheshire side of the river Mersey, which is rapidly rising into importance. It is opposite Liverpool, and the distance from one bank of the river to the other is 1340 yards. Birkenhead owed its origin to the foundation of a Benedictine priory in the reign of Henry II. The prior enjoyed the right of ferry across the river. Birkenhead was extra-parochial and a chapelry in the parish of Bidstone; but by a local act it is constituted a township under the government of commissioners. In 1843 an act was obtained for including the township of Claughton-cum-Grange, and part of the township of Oxton, within the jurisdiction of the commissioners, which now extends over an area of about 1300 acres. In 1833 an act was passed for paving, lighting, watching, and otherwise improving Birkenhead, for regulating its police, and for establishing a market; and in 1841 another act was obtained for supplying the town with water and for lighting it with gas. In 1842 the town commissioners were empowered by act to purchase the manorial rights, &c. pertaining to the antient ferry at Woodside, which is the nearest ferry to Liverpool; and in 1844, under another act, they purchased Monk's Ferry. In 1844 they obtained an act of still greater importance, under which a tidal basin, docks, and other extensive accommodations for trade and shipping are now in progress. The magnitude of these works may be inferred
from the following abstract, which is taken from the
New market, 20,000*l*.; townhall, 10,000*l*.; park,
docks in Wallasey Pool, 400,000*l*.; dock wareho
private company), 600,000*l*. The design of conver
lasey Pool, on which Birkenhead is situated, into d
entertained several years ago, and originated with
Mr. Laird, but it was not until 1844 that an act,
mentioned, was obtained for effecting this object.
stone of the proposed docks was laid on the 23rd of
1844. The area of the principal or floating dock
acres, a space exceeding that of all the docks in
and it will have 19 feet depth of water. It will be
with quays, warehouses, and other conveniences fo
and discharging cargoes. There will also be a tid
of about 40 acres, accessible at all times by
steamers employed in the coasting trade, and by
whose draught does not exceed 15 feet; a harbour
with an area of 10 acres; and beaching-ground
acres, for the free use of the river-craft. In
1845, the commissioners purchased the Herculan
at Liverpool, in order to accommodate vessels w
require to unload or take in part of their cargo
pool, by which means they will be saved the
paying full dock charges. Besides these advant
port, Birkenhead possesses a communication
with the populous midland counties, by means of
21 miles in length, which passes through Ch
joins the Grand Junction Railway at Crewe,
from Birmingham. A line of railway from Manc
Cheshire will also closely connect Birkenhead with
on the east, and with Shropshire and Wales on
west. There are two railway termini at Birkenhe
Monk's Ferry, which is reached by means of a
about 500 yards in length, which cost 20,000*l*.
openéd October 17, 1844; and the other terminus
to be at the docks, which will also be rea
tunnel. By these means the London and Birmi
Grand Junction Railways may possess a wat
minus for the Irish traffic.

The commissioners for the improvement of
are invested with powers which enable them to
practice all those sanatory regulations which ha
been so much neglected in large towns. One
acts provides for the appointment of a Board of He
width of courts is regulated, and the streets alr
gress are wider than in the best parts of most tow
north-west part of the township, on rising grou
containing 226 acres has been laid out, which will
planted, and ornamented with two lakes. The w
enclosed with iron railings, and there will be a
lodges. The elevation and design for villas and
the park are to be subject to the approval of t
sioners. On the western side of the park there
cemetery of 71 acres, situated on elevated groun
ton Square, about three minutes' walk from Monk
an area of 6½ acres, four of which are enclosed and
a shrubbery. The houses are handsomely buil
townhall forms the centre of the southern side of
A market-hall is erecting, which will be 430 feet
feet broad, with six entrances; and it is intended
shall be 42 shops and 80 stalls, which will be plen
plied with water from the roof. It is expected t
of surplus land in the immediate vicinity of the
defray the cost of its erection. Slaughter-houses
be built in a suitable situation. The commission
empowered to erect public baths. The number
is at present two; St. Mary's, built in 1817, and o
completed. The church-yard of St. Mary's inc
of the burial-ground of the ancient priory. Prep
now (March, 1845) making for the erection of a t
with a parsonage-house. There are quarries of
ing-stone in the township. There is a Scotch c
one Independent and one Wesleyan chapel.
has several good hotels, a news-room, a savings'-
several other useful institutions. The communi
Liverpool is kept up by small steam-boats which
each side of the river every half-hour at the fare of
In 1843 the number of passengers by the ferries ex
millions. It is intended that the boats shall soon
running every quarter of an hour at one penny,
half the year they are to ply both night and day.
of the ferry are a source of great emolument to the
missioners. In November, 1844, the receipts w

418*l.* more than in the corresponding month of
other source of municipal income consists of
s; and when the docks are opened, there will be
rt charges, and after the market is completed, the
s and stalls.

lation of the chapelry of Birkenhead was under
; in 1831, it exceeded 2000; and at the present
nship, with Tranmere, Holt Hill, Oxton, Bidstone,
her places in the immediate neighbourhood, are
l to have a population of at least 16,000 inhabit-

GHAM. The statistics of BIRMINGHAM, P. C.,
given with less completeness and accuracy than
er large towns in England, the present oppor-
en for supplying omissions, and also of noticing
matters relating to the present state of the town.
amentary borough of Birmingham consists of the
Birmingham and Edgbaston, and the two hamlets
and Bordesley and Duddleston-cum-Nechells.
ctive area and population are as under:—

	Area in acres.	Population in 1841.
ham	2,660	138,215
on	2,790	6,609
l and Bordesley	13,330	18,019
ton-cum-Nechells		20,079
	18,780	182,922

wing particulars, abstracted from the census returns
ow the population, &c. of the parish of Birmingham
the borough:—

	Parish.	Borough.
cres	2,660	18,780
nhabited	27,272	36,121
Uninhabited	2,958	3,847
Building	226	323
	67,317	88,572
	70,898	94,350
sons	138,215	182,922
les under 20 years	31,087	41,211
nales under 20 years	31,940	42,598
les 20 years and upwards	36,230	47,361
nales 20 years and upwards	38,958	51,752
sons born in the county	96,768	128,202
sons born elsewhere	41,447	54,720

,202 persons born in the county of Warwick and
he borough of Birmingham on the 6th of June,
were 61,315 males and 66,887 females; born in
sh counties, 22,950 males and 24,438 females;
land, 463 males and 257 females; born in Ireland,
and 2056 females; foreigners or British subjects
eign parts, 378 males and 179 females; and the
h of 839 males and 531 females was not ascertained.
ber of births in 1842 was 5094, which was 1516
e number of deaths. The number of illegitimate
07, or 4·1 per cent. In the same year the num-
iages was 1018, and 924 were solemnized accord-
tes of the Established Church; 73 took place at
laces of worship used by Dissenters; and 21
e united at the superintendent-registrar's offices.
r of men married under age was 25, or only 2·4
nd the number of women married under age was
per cent.: for England the proportions are re-
5 and 13·5 per cent. of persons married under age.
deaths (1829 males and 1749 females) there were
dren under one year, and 1667 of children under
five. In the previous year above one-half the
8 out of 3305) were those of children aged under
e are only three towns, Manchester, Leeds, and
where the infant mortality is higher. The annual
of deaths to the population is 2·7 per cent.,
whole of England 2·2 per cent.; but the mortality
n Liverpool, Manchester, Sheffield, and Bristol,
mingham. The number of inquests held in the
s 263 in 1844; and the average of the five years,
o 1844 inclusive, was 256. In 1844 the ratio of
the total deaths was 1 in 16·63. The number of
ccident was 109; died by the visitation of God,
es, 9 (in 1842, 20; and in 1843, 25); burnt to
(in 1841 and 1842, 53 in each year); number
1; accidents by machinery, 2; killed by explo-
re-arms, 1; verdicts of manslaughter, 4; of mur-
coroner for the borough was first appointed in
e cost of the coroner's court in 1844 was 926*l.*
ity of population is greater in Birmingham than in several of the largest towns in which the mortality is higher. In the parish of Birmingham there are 33,255 persons to a square mile; but the town is remarkably exempt from fever, and typhus is rare. There are no cellar-dwellings; but there are about 2030 courts, containing 12,254 houses, which, at four persons to each house, would give a population of 49,016; but nearly every family has a separate dwelling. There are about 40 miles of main sewers in the parish, and 3500*l.* a year is paid for cleansing the streets; but the drainage, paving, and cleansing of the courts and narrow streets are a good deal neglected, as in other large towns. The minimum width of streets under the last local act is 42 feet. In September, 1843, there were 1681 pigsties in the parish. On the other hand, the elevated situation of the town, and the dry and porous nature of the subsoil on which it is built, are favourable to health. The rise on the south side, from the river Rea, is 115 feet in 3000 yards; and from the Brook, on the north side, the rise is 70 feet in 2000 yards. The terminus of the London and Birmingham Railway, in the lower part of the town, is 376 feet above the level of low-water mark at London Bridge. The summit level of one of the canals is 460 feet above the level of the sea, and a considerable portion of the borough has a still higher elevation. The pavement of St. Philip's Church, which is nearly in the centre of the borough, is 475 feet above the level of the sea; and St. Paul's Churchyard is about fifty feet higher than the top of the cross of St. Paul's, London. Birmingham is well supplied with water, which is generally of good quality. There are about 80 miles of water-pipes, and about 8000 houses out of 40,281 are supplied by this means; and there is a pump in nearly every court. The charge for water service is 9*s.* a year for small tenements. The comfort of the population is increased by the cheapness of fuel: good coal is sold at 10*s.* per ton. The occupations of the working-classes are not, generally speaking, prejudicial to health, and with proper management and prudence the rate of wages which they receive is sufficient, when trade is prosperous, to procure them a sufficient supply of the necessaries of life. The minute division of labour, and the variety of operations which characterize the staple manufactures of Birmingham, are favourable to the well-being of the working-classes; for, as it seldom happens that all the members of a family are engaged in the same kind of manufacture, it follows that in seasons when trade is not good there is a better chance of some branch or other of industry, on which the livelihood of the family depends, escaping the general depression. The state of education and of pauperism will be subsequently noticed.

In nearly every house in England there is in use, at almost every hour of the day, some article or other of Birmingham manufacture. The subdivision of employments in Birmingham is very remarkable. 'There are very few large factories, properly so called, in which an article goes through the entire range of manufacturing processes; but there is a vast number of workshops, more or less extensive, in each of which portions of the work are done. One manufactured article, which is sold retail for a penny, may go through twenty workshops before it is finished; some having forty or fifty workmen, some four or five, while some are simply the garrets of workmen who ply their trade by their own fire-side. With the exception of the metropolis, there is perhaps no town in England where there are so many persons combining in themselves the characters of master and workman, as Birmingham, and none in which there is more observable a chain of links connecting one with another.' ('A Day at the Birmingham Factories,' by Mr. G. Dodd, in Supplement to 'Penny Magazine' for November, 1844.) The most recent account of the manufactures of Birmingham, including those in electro-metallurgy, will be found in the Supplements to the 'Penny Magazine' for October, November, and December, 1844.

The following abstract from the returns obtained at the last census includes nearly all the occupations which constitute the staple of the Birmingham trade:

Anvil-makers, 25; awl-blade makers, 43; bellows-makers, 113; brass-finishers and workers, 278; brass-founders and moulders, 3056; braziers and tinkers, 195; burnishers, 181; button-makers (all branches), 2898; candlestick-makers, 55; chain-makers, 132; clock and watch makers (all branches), 244; cock-founders, 154; comb-makers, 109; die sinkers and makers, 146; engine and machine makers, 245; engineers and engine-workers, 309; fender-makers, 96; file cutters and makers, 191; fire-iron makers, 91; founders, (branch not specified), 514; frying-pan makers, 35; German silver manufacturers, 63; gimlet-makers, 49; glass manufacturers (all branches), 964; gold-beaters, 131; gun and pistol makers (all branches), 1781; gun-barrel makers (all branches), ; hinge-makers, 132; iron manufacturers (all branches), 499; ironmongers, 87; ivory turners and workers, 70; japanners and lacquerers, 631; jewellers, goldsmiths, and silversmiths, 1398; lamp-makers, 244; lapidaries, 90; lock and key smiths, and bell-hangers, 314; mill-makers, 34; moulders (branch not specified), 83; nailors and nail-makers, 483; opticians, 47; ornament-makers, 37; patten and clog makers, 80; pattern-designers, 35; pen (steel) makers, 306; pin-makers (all branches), 120; plane-makers, 82; plated ware manufacturers, 34; platers, 730; platers, silver, 170; polishers, 227; pump-makers, 47; ring makers and turners, 40; rule-makers, 174; saddle-tree makers, 33; saw-makers, 36; screw-makers, 438; snuffer-makers, 146; spoon-makers, 348; spur-makers, 33; stampers and piercers, 312; steelyard-makers, 25; stirrup-makers, 33; sword cutlers and makers, 86; thimble-makers, 87; tin-plate workers and tinmen, 249; tool-makers, 350; tool (edge) makers, 54; toy-makers (in bone, gilt, glass, silver, steel, and tin), 924; tray-makers, 112; tube-makers, 27; umbrella and parasol makers, 129; urn-makers, 27; vice-makers, 23; whitesmiths, 193; wire-drawers, 277; wire-workers, 234.

In 1838 the average weekly wages of 791 persons engaged in about one hundred different branches of manufacture and handicraft in Birmingham were as follows:—

Ages.	Males.	Females.
7 to 13	3*s.* 1*d.*	2*s.* 4*d.*
14 to 20	5*s.* 9*d.*	5*s.* 2*d.*
Adults	24*s.* 3*d.*	8*s.* 0*d.*

Of the above 791 persons, 33 per cent. were workers in brass and copper; 11 per cent. in iron; 5 per cent. in guns and pistols; 4 per cent. in gold and silver; 1½ per cent. were glass-cutters; and the remainder were employed in a variety of other occupations. The average wages of adults are not high, but the income of families is often considerable when the wages of women and persons under 20 are added to the earnings of the head of the family. The occupation returns under the census show that out of a population of 182,000, the number engaged in some kind of occupation which was specified, was—males above 20, 43,688; males under 20, 8083; females above 20, 12,335; females under 20, 5245; and in 1024 cases the branch of employment was not specified. The number of persons of independent means was 3908; number of alms-people, pensioners, paupers, and beggars, 1075; number of 'other persons' (persons in barges, prisoners, &c.), 499; and the residue of the population consisted of 32,681 males under 20; 1621 above 20; 35,789 females above 20; and 36,974 females under 20.

Steam-power was first employed in manufactures at Birmingham in 1780. From 1780 to 1815 only 42 engines were set to work; from 1815 to 1830 there were 178; and from 1830 to 1838 there were 120 new ones. In January, 1839, the number of steam-engines at work was 240, of 3436 horses' power. The total quantity of coal consumed per day was estimated at 240 tons; and the number of persons employed in connection with steam-power was 5200 males and 1762 females. In the metal trades of the town 2155 horses' steam-power was employed, and the following is given as an estimate of the amount of power consumed in different branches:—

210	horses' power;	employed by iron-founders, engineers, and smiths; and steam first applied to these purposes in	1788
650	„	in rolling metals; and first applied	1790
170	„	in drawing wire; and first applied	1808
201	„	in iron forges and wrought-iron mills; and first applied	1810
78	„	in nail-cutting	1813
122	„	in wood-screw making	1819

The remainder of the steam-power was employed as follows:—grinding flour, 257 horses' power; glass-works, 95; wood-sawing, 152; paper-making, 60; colours and chemical preparations, 128; clay-grinding, 38; pumping, 444; sundries, 107; and engines of 159 horses' power were not at work.

An office for assaying and making silver was established at Birmingham in 1773; and in 1825 for gold. From 1773 to 1839 there had been assayed and marked 4,011,997 ozs. of silver. The quantity in the following years was:—

	Ounces.
1773-4	16,893
1800-1	37,473
1820-1	55,392
1838-9	114,500

The duty on gold and silver marked and assayed
in each successive year from 4877*l.* in 1839, to
1842; and this falling off marks a period of general
throughout the country. The quantity of gold assayed
was 2125 ozs.

The increase of wealth is indicated to some ext
number of carriages which paid duty at different pe
1816 there were 404; in 1826, 697; and in 1839,
in 1839 the duty was less than one-half of the amou
in 1816.

In 1838 a very elaborate investigation was made,
direction of the Birmingham Statistical Society, in
of education in Birmingham; and the following are
of this inquiry:—

Description of Schools.	Number of Schools.
Sunday Schools:	
Church of England	15
Roman Catholic	2
Dissenters	39
Total	56
Returned also as day or evening scholars	..
Sunday-school scholars only	..
Infant-schools (private)	3
Dame schools	267
Common day-schools	177
Superior private and boarding schools	97
Supported solely by the scholars	544
Infant-schools supported partly by the public	7
Charity and endowed schools	26
Total	577
Evening schools supported by the scholars	36
Total number of schools and scholars	669
Evening schools attached to Sunday-schools	21

At the time the inquiry was made the populati
mated at 180,000, and the number of children in
at 45,000. Of the children 48·5 per cent. were
struction in day and Sunday schools, and 51·5 per
not receiving instruction in either. From similar
has been ascertained that the number of children
and 15 years of age who were not receiving in
any school was 17·8 per cent. in the borough of
cashire, in 1835; 30·7 per cent. in Manchester
in 1834 and 1835; 34·7 per cent. at York in 183
cent. at Liverpool in 1835 and 1836; and 65·9
four parishes in the city of Westminster in 1837.
ber of children attending schools was less in
than in any of the above-mentioned places, exce
pool and in the four Westminster parishes. So
ability to write may be taken as a proof of ed
borough of Birmingham is below Cumberland,
land, Northumberland, the North and East Ridin
shire, Durham, and Derbyshire, for out of 1018
1842 there were 283 men (27 per cent.) and
(44 per cent.) who signed the register with
The proportion for England and Wales in the sa
respectively 32 and 47·9 per cent.

The want of public places of recreation and
amusement is much felt at Birmingham. Many
when the town was far less populous, the arti
small garden in the suburbs, which he cultivated
time; but ground for such a purpose cannot now
convenient distance. At the close of 1844 it
that there should be public performances on the
the townhall once a-week, with the especial objec
ing an agreeable and healthful enjoyment to t
classes; and the plan is said to have succeeded.
tickets are issued at a small charge, and each pe
attended by a thousand or thirteen hundred perso
scription, amounting at present (March, 1845
6000*l.*, has also been raised for erecting baths for

e number of public-houses, &c. in 1834 and 1839 :

	Alehouses.	Spirit-shops.	Beer-shops.
. . . . . .	410	108	574
. . . . . .	511	129	549

he police reported that there were 314 houses in to which prostitutes resorted, in addition to 187 ney lodge. There were 81 houses which were the receptacles of stolen goods, and 288 houses esort by thieves, each of which was on an aver- ted by 12 thieves. The number of persons fore the borough magistrates is about 4000 the week ending February 17, 1845, the number h felony was 23; misdemeanour 24; drunkenness cy 2. On an average of ten years ending Lady- the annual sum expended for the relief of the ,289l.: average weekly number of in-door paupers or cases 3250, which, assuming each person to persons, would make 8126, and the total of in r paupers would therefore average weekly 8819: number was 11,893. To this number must be ersons employed in stone-breaking, and who may to represent 902 persons, and there were besides nts relieved weekly. The rates for the relief of e collected and expended under a Board of Guar- ally constituted by 23 Geo. III., but which is ed by an act of 1 & 2 Wm. IV. The number of one hundred and eight, who are elected triennially, rseers and churchwardens for the time being form board. The rules and orders of the Guardians resemble those adopted in Unions under the Poor lment Act. Gratuitous medical relief is extensively Birmingham; and in 1843 the number of patients wing hospitals, infirmaries, and dispensaries was d it appears that in about one-fifth of the births s had to these public institutions:—

	In-Patients.	Out-Patients.
ospital . .	1627	10,055
spital . .	766	2,000
rmary . .	1170	5,818*
ispensary . .	2653	771 midwifery
nary . . .	12	2,459
formity Institution	..	153
nstitution . .	..	350

he number of in-patients at the General Hospital out-patients 9052; amount of subscriptions 2161l.; e 6384l. Cost of each out-patient 1s. 10d.; of ent 2l. 7s. 7d., and without including the cost of niture, and other establishment expenses the actual 2s. 1d.

h of Birmingham is divided for ecclesiastical pur- ur district parishes: St. Martin's and St. Philip's, ins a population of 94,316; St. George's, 24,499; 's, 15,078; and All Saints, 4322. For all civil rmingham is considered as one parish.

clause in the Municipal Reform Act, enabling ply for a charter of incorporation, the borough of a was incorporated by royal charter dated October The municipal boundary is co-extensive with the e parliamentary borough. The number of parlia- ctors in 1839-40 was 4619, and in 1842-3, 6129. pal purposes the borough is divided into 13 wards. ate body consists of a mayor, 15 aldermen, and 48

There are 10 wards in the parish of Birming- the hamlet of Deritend and Bordesley, the hamlet ston-cum-Nechells, and the parish of Edgbaston, one ward. The wards of the parish of Birming- Lady Wood, with a population of 8787; All Saints, lampton, 11,037; St. George's, 19,648; St. Mary, t. Paul, 8973; Market Hall, 13,014; St. Peter, t. Martin, 13,325; and St. Thomas, 18,254. The the borough fund in the year ending August, 41,613l., and the expenditure was 24,716l. The s its own court of quarter-sessions. Considerable has recently taken place respecting a bill to provide regulations and good government of the borough, e transfer of the prison and public offices (now the Guardians of the Poor) to the town council; vote of the town council on February 24, it was d not to proceed with the bill. There are at present three distinct bodies of commissioners for lighting, paving, and cleansing the borough; and four distinct boards of surveyors under the Highway Act. The Street Act Commissioners form an important local body, consisting of one hundred members. They discharge many of the duties which in other places ordinarily devolve on the town council. On the 27th of February, 1845, a bill was introduced into the House of Commons under their authority for effecting various improvements in their administration. The inhabitants of the hamlet of Duddleston-cum-Nechells are under separate commissioners, and on the same day a bill was also introduced for effecting improvements in the local administration, cleansing, paving, sewerage, &c. of those parts of the borough.

(*Returns under the Census Acts of Population and Occupations; Reports of Registrar-General; First Report of the Commissioners for Inquiry into the State of Large Towns*, &c., 1844; *Second Report*, 1845; *Report of the Sanatory Commissioners*, 1842: 'Economical Statistics of Birmingham,' in *Journal of London Statistical Society*, January, 1840, vol. ii. part vi.; 'Report on the State of Education in Birmingham,' in *Journ. of Stat. Soc.* vol. ii. part vii., April, 1840, &c.)

BIRTH. [INFANTICIDE, P. C.]

BISHOP, BISHOPRIC. Since the articles under these heads (P. C.) were written (in 1835) there have been several important changes in relation to the dioceses and revenues of the bishops in the United Church of England and Ireland. The inequality in the extent of dioceses has been in part remodied, first by the creation of the new sees of Ripon and Manchester, by 6 & 7 Wm. IV. c. 77, and next by remodelling the old dioceses. The newly created see of Manchester will not be filled up until a vacancy occurs either in the see of Bangor or St. Asaph; and whenever such vacancy occurs the above two Welsh bishoprics will be united, so that no addition will be made to the episcopal bench by the erection of Manchester into a bishop's see. A bishop was appointed to the new see of Ripon soon after the passing of 6 & 7 Wm. IV. c. 77; and as the same act made provision for the union of the sees of Gloucester and Bristol on a vacancy occurring in either of them, the number of bishoprics in England and Wales remains unaltered. Gloucester and Bristol no longer exist as separate sees, as their union has taken place. The bishop is styled Bishop of Gloucester and Bristol, and the congé d'eslire for his election will be addressed to the chapters of Gloucester and Bristol alternately. The diocese of Ripon is formed of detached parts of the dioceses of York and Chester. The diocese of Manchester will consist of the whole county of Lancaster, except the deanery of Furnes and Cartmel. The act 6 & 7 Wm. IV. made provision for uniting the see of Sodor and Man to that of Carlisle; but by 1 Vict. c. 30, its existence as a separate bishopric was preserved. The act 6 & 7 Wm. IV. c. 77, not only remodelled dioceses, but provided for a more equal distribution of episcopal revenues, according to the following scale:—

Archbishops.	
Canterbury . .	£15,000
York . . .	10,000
Bishops.	
London . . .	10,000
Durham . . .	8,000
Winchester . .	7,000
Ely . . .	5,500
St. Asaph and Bangor .	5,200
Worcester . .	5,000
Baths and Wells . .	5,000

The other bishoprics are augmented by fixed contributions out of the revenues of the richer sees, so as to increase their average annual incomes to not less than 4000l. nor more than 5000l. Thus under an Order in Council, dated 21st June, 1837, on the next vacation of the following sees, they will annually contribute to the Episcopal Fund as follows: See of Canterbury 7300l. a-year; York 1100l.; London 5000l.; Winchester 3600l.; Bath and Wells 1000l.; and Worcester 2300l. a-year. The surplus revenues are paid into the hands of the Ecclesiastical Commissioners, and constitute what is called the Episcopal Fund; and every seven years, from Jan. 1, 1837, a new return is to be made by them of the revenues of all the bishoprics, and thereupon the scale of episcopal payments is to be revised, so as to preserve the [illegible] by the act. Provision was also made in this act for a more equal distribution of patronage among the [illegible] proportioned to the relative magnitude and importance [illegible] respective dioceses.

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* addition 3828 persons were visited at their own homes.

Under the act 3 & 4 Wm. IV. c. 37, and 4 & 5 Wm. IV. c. 90, which reduced prospectively the number of archbishoprics in Ireland from four to two, and the number of bishoprics from eighteen to ten, the alterations which it was intended to effect have already by lapse of time been nearly completed. The number of archbishops at present (March, 1845) is two and the number of bishops twelve. The future income of the episcopal establishment in Ireland will be 82,953*l.*, being a saving of 68,175*l.* a-year on the former establishment. This latter sum is under the management of the Ecclesiastical Commissioness of Ireland, and must be dispensed for ecclesiastical and educational purposes.

The bishoprics in the British colonies have lately been increased by the creation of several new sees. The oldest colonial bishopric was that of Nova Scotia, created in 1787, and when the articles BISHOP and BISHOPRIC, P. C., were written, there were also the bishoprics of Quebec, Jamaica, Barbadoes, and Calcutta. To these have been recently added the bishoprics of Toronto, Newfoundland, British Guiana, Antigua, Madras, Bombay, Australia, Tasmania, New Zealand, Gibraltar, and New Brunswick. Some of these bishoprics have been created by letters patent, and their revenues and jurisdiction are regulated by acts of parliament; but others, as those of New Zealand, Tasmania, Antigua, Gibraltar, &c., are not of royal or parliamentary creation, but have been established by the archbishops and bishops, in concert with or by consent of the ministers of the crown. In 1841 a meeting was held of the archbishops and bishops of England and Ireland at Lambeth Palace, when it was agreed to undertake the charge of funds then raising for the endowment of bishoprics in the colonies, and to become responsible for their application. In no case do they proceed without the concurrence of the government. In 1841, in pursuance of this resolution, the bishopric of New Zealand was created; in 1842, the four bishoprics of Guiana, Antigua, Gibraltar, and Tasmania; in 1844, Newfoundland and New Brunswick, and in 1845 Ceylon. As funds for endowments are raised, bishops will be consecrated for the Cape of Good Hope, and next for Sierra Leone, South Australia, Western Australia, Port Philip, and for Northern and Southern India. British colonies or dependencies which are not within any diocese are considered to be under the pastoral care of the Bishop of London.

There are thirty-two Roman Catholic archbishops, bishops, coadjutor bishops, and vicars-apostolic in the British colonies. At Sidney, Quebec, and in Bengal, the Roman Catholic prelates are of the rank of archbishops.

In 1840 a very important act (3 & 4 Vict. c. 86) was passed 'for better enforcing Church Discipline,' which repealed the old statute (1 Hen. VII. c. 4) under which bishops were enabled to proceed against their clergy, and sentence them to imprisonment. The new act provides 'that in every case of any clerk in holy orders of the United Church of England and Ireland who may be charged with any offence against the laws ecclesiastical, or concerning whom there may exist scandal or evil report as having offended against the said laws, it shall be lawful for the bishop of the diocese within which the offence is alleged or reported to have been committed, on the application of any party complaining thereof, or if he shall think fit, of his mere motion, to issue a commission under his hand or seal to five persons, of whom one shall be his vicar-general, or an archdeacon or rural dean within the diocese, for the purpose of making inquiry as to the grounds of such charge or report: provided always that notice of the intention to issue such commission under the hand of the bishop, containing an intimation of the nature of the offence, together with the names, addition, and residence of the party on whose application or motion such commission shall be about to issue, shall be sent by the bishop to the party accused fourteen days at least before such commission shall issue.' The bishop may at once pronounce sentence, by consent of the clerk; and such sentence is good and effectual in law. If he refuse or neglect to appear and make answer to the articles alleged against him, other than an unqualified admission of the truth thereof, 'the bishop shall proceed to hear the cause, with the assistance of three assessors, to be nominated by the bishop, one of whom shall be an advocate who shall have practised not less than five years in the court of the archbishop of the province, or a sergeant-at-law, or a barrister of not less than seven years' standing, and another shall be the dean of his cathedral church, or of one of his cathedral churches, or one of his archdeacons, or his chancellor; and upon the hearing of such cause the bishop shall determine
the same, and pronounce sentence thereupon according
ecclesiastical law.' While the charge is under investiga
the bishop may inhibit the party accused from perfor
any services of the church within his diocese until sen
has been passed; but if the person accused be the incumb
of a benefice, he may nominate any person or persons
form such services during his inhibition, and such perso
to be licensed by the bishop if they are approved of by
Appeals under the act are to the archbishop, and they
be heard before the judge of the court of appeal in his
vince; but if the cause has been heard and determined
first instance in the court of the archbishop, the appeal
to the Queen in Council, and is to be heard before
Judicial Committee of Privy Council, and at least one
bishop or bishop must be present.

In matters of dispute between a diocesan and his clergy
appeal lies to the archbishop of the province in all
excepting curates' stipends (1 & 2 Vict. c. 106).

Rolle, an old authority, contended that the archb
might appoint a coadjutor to one of his suffragans who
firm or incapable. This power is now established by
Vict. c. 62, entitled 'An act to provide for the perform
of the episcopal functions in case of the incapacity
bishop or archbishop.'

In 1841 a bishop of the United Church of England
Ireland was appointed for Jerusalem. The King of P
first suggested the appointment to Queen Victoria, an
right of appointing the bishop will be enjoyed alternat
the crowns of Prussia and England; but the Archbish
Canterbury has a veto on the selection by Prussia.
Bishop of Jerusalem is a suffragan of the Archbishop of
terbury; but he cannot exercise episcopal functions
dominions of Great Britain, nor can the persons ordain
him. The Protestant Church of Jerusalem will comp
persons using different liturgies and subscribing differ
ticles of faith, who will be on terms of equality as me
The bishop may ordain Prussian clergymen, on their
the Augsburg Confession and adopting the Prussian li
and Englishmen, on their subscribing to our article
liturgy. He is the legal protector of all Protestants of
denomination against the Turkish government. The
Vict. c. 6, was passed to enable the archbishops of Can
and York, and such bishops as they might select, to co
a foreign bishop. The instructions given by the K
Prussia to his envoy with respect to the establishment
bishopric of Jerusalem, are copied in the 'Eccles
Gazette,' March 11, 1845.

At the present time there are twenty-four bishops of the
testant Episcopal Church of the United States of Ameri
this church the superior powers of church government are
in a General or National Convention which meets trien
The Convention consists of two houses. The bishops
body in their own right and form a separate House.
lower House is composed of lay and clerical delegates.
diocese is represented by four laymen and four of the
who are elected by local Diocesan Conventions. Th
members of the Diocesan Conventions are elected by
respective congregations or vestries. The general Co
tion, amongst other things, has the power of revising
making new canons. It hears and determines charges
bishops; receives and examines testimonials from Dio
Conventions recommending new bishops, and decides
their appointment: without the certificate of the Ge
Convention a bishop cannot be consecrated. At the Ge
Convention which assembled at Philadelphia in Oc
1844, 'sentence of suspension' was passed on a bishop b
House of Bishops. They adjudged him to be 'susp
from all public exercise of the office and functions
sacred ministry, and in particular from all exercise wh
ever of the office and work of a bishop of the church of
The title assumed by a bishop in the United States is '
Reverend.'

The bishops of the Methodist Episcopal Church
United States have no particular province or district.
time is chiefly spent in attending the different annu
ences of the church.

The Roman Catholic hierarchy in the United Stat
posed of one archbishop, fifteen bishops, and five
The first Roman Catholic bishop in the United State
secrated in 1790.

England and Wales are divided by the Roman Ca
Church into 'Districts,' over each of which a bishop has
placed, who is a *bishop in partibus*. The London Distri

led by a bishop who is styled the Bishop of Olena;
District by the Bishop of Ariopolis; the Western
the Bishop of Pella; the Central District by the
Cambysopolis; the Lancashire District by the
Tloa; the District of York by the Bishop of Tra-
Northern District by the Bishop of Abydos; and
District is under a vicar-apostolic, the Bishop of
Scotland is divided in a similar manner. Each
Great Britain is subdivided into Rural Deaneries.
oan Catholic hierarchy in Ireland consists of four
and twenty-two bishops. In the Charitable Dona-
ind) Act (7 & 8 Vict. c. 97) the Roman Catholic
designated for the first time since the Reformation
iscopal titles. They had been referred to in the
irst brought in, as 'any person in the said church
of any higher rank or order,' &c.; and, on the
of the government, this was altered to 'any arch-
shop, or other person in holy orders, of the Church
In December, 1844, a royal commission was issued
the Board of Charitable Bequests in Ireland, and
man Catholic archbishops and bishop who are ap-
mbers of the Board are styled 'Most Reverend'
Reverend,' and are given precedency according to
pal rank.
d in a recent authority, that the number of Roman
chbishops in Europe is 108, and of bishops 469;
ere are 154 bishops in other parts of the world;
tal of 731 bishops. In France there are 14 arch-
66 bishops.

TA. [Polygonum Bistorta, P. C.]

ROD, USHER OF THE, is an officer of the
ords. He is styled the Gentleman Usher of the
and is appointed by letters-patent from the crown.
is styled the Yeoman Usher. They are the offi-
gers of the Lords; and either the Gentleman or
Usher summons the Commons to the House of
the royal assent is given to bills. 'He executes
he commitment of parties guilty of breaches of
d contempt, and assists at the introduction of
ther ceremonies.' (May's *Parliament*, p. 156.)
officers of the Legislative Council of Nova Scotia
tleman Usher of the Black Rod.

BERRY. [Rubus, P. C.]

WILLIAM. This extraordinary artist was the
ndon hosier, and was born in London in 1757.
f fourteen, his father was induced by his son's
rawing to apprentice him to an engraver of the
re. He was a diligent and enthusiastic student;
evoted to the graver, and the night to poetry, for
art absorbed but one-half of him, and he was
erent to the goods of this life: he used to say—
s is not to gather gold, but to make glorious
ressing god-like sentiments.' When he was
ears of age, he married Catherine Boutcher, who
, and was a most devoted and attached wife, and
ated the peculiarities of his mind. They lived at
Street, and there Blake, with his wife always by
duced a series of designs and poems, which are
in the peculiar spirit of their conception, but
ing their peculiarity, are replete with beauties of
order. The spirit of universal benevolence and
tion of the greatness of life, animate and inanimate,
is poems, and cannot easily be surpassed; but the
ation is often very inharmonious. When Blake was
years of age, Flaxman and another gentleman
collection of his poems, and presented the printed
poet, under the hope that he might derive some
he sale of them.
of his own publications were the 'Songs of Inno-
Experience, showing the two contrary states of
Soul,' which appeared with about sixty-five etched
in 1789. Several of these poems are remarkable
e pathos.
hings and poems are executed in a very peculiar
manner; the designs are drawn and the poems
the copper, with a secret composition (discovered
e spirit of his brother Robert, as he says); and
ncovered parts of the plate were eaten away by
the rest remained as if in stereotype. His wife
the plates in the press, and Blake tinted the im-
esigns, and letter-press, with a variety of pleasing

work was 'The Gates of Paradise,' in sixteen small designs, of a very mystical character. This was followed by a series, dated Lambeth, 1794, of twenty-seven designs, four inches by six, under the title 'Urizen,' in which he seems to have attempted to represent hell and its mysteries; this extravagant work, says Allan Cunningham, 'is not a little fearful to look upon; a powerful, dark, terrible, though undefined and indescribable, impression is left on the mind, and it is in no haste to be gone.' After the completion of this work, Blake was employed by Mr. Edwards, a bookseller, to illustrate Young's 'Night Thoughts,' which he filled with marginal designs; so much to the satisfaction of Flaxman in many parts, that he introduced Blake to Hayley, the poet, who wished him to make some illustrations to the Life of Cowper, and persuaded him to remove, in 1800, to Felpham in Sussex. Flaxman was a constant friend to Blake, and the latter in his correspondence with him usually addressed him 'Dear Sculptor of Eternity,' and in the first letter he wrote to him from Felpham he called him 'Sublime Archangel.'

At this time Blake's mind was confirmed in that extraordinary state which many suppose to have been a species of chronic insanity. He was so exclusively occupied with his own ideas, that he at last persuaded himself that his imaginings were spiritual realities. He thought that he conversed with the spirits of the long departed great—of Homer, Moses, Pindar, Virgil, Dante, Milton, and many others: some of these spirits sat to him for their portraits. He remained at Felpham three years, and then returned to London. The first work after his return was his Jerusalem, comprising one hundred designs, of figures of men, spirits, gods, and angels; and for which, tinted, he charged twenty-five guineas. His next work were twelve designs to Blair's 'Grave,' for Cromek the engraver, who paid him twenty guineas for the twelve, but Blake was not allowed to engrave them himself; they were intrusted to Schiavonetti. These were followed by his 'Canterbury Pilgrimage,' a picture in water-colours or distemper, exhibited in his brother's house in 1809, with some other of his paintings in the same manner, of which he printed a 'descriptive catalogue,' containing many critical heresies, some sense, and much that is wild and absurd. The following extract from p. 27, though extreme, is founded in truth:—'As there is a class of men, whose whole delight is the destruction of men, so there is a class of artists whose whole art and science is fabricated for the purpose of destroying art: who these men are is soon known: "by their works ye shall know them." All who endeavour to raise up a style against Raphael, Michael Angelo, and the antique; those who separate Painting from Drawing; who look if a picture is well drawn; and if it is, immediately cry out, that it cannot be well coloured—those are the men.' Charles Lamb speaks of 'the Canterbury Pilgrims' in a letter to a friend as a work with 'wonderful power and spirit, but hard and dry, yet with grace.' In the same letter he says, 'I have heard of his poems, but never seen them. There is one to a tiger, which I have heard recited, beginning—

> "Tiger, tiger, burning bright,
> Through the deserts of the night"—

which is glorious. But, alas! I have not the book, and the man is flown, whither I know not—to Hades or a madhouse—but I must look on him as one of the most extraordinary persons of the age.'

In the descriptive catalogue of his exhibition, he makes some excellent remarks upon the character of Chaucer's writings; and some excessively severe remarks upon the 'Canterbury Pilgrimage' of Stothard. He seems to have injured himself very much in the opinion of the world by the extremities he went to in this catalogue; he was comparatively neglected after its publication, and the demand for his works very much declined. He became extremely poor, but he still continued to produce new works, as Twenty-one Illustrations to the Book of Job, which are among his best productions; two works of prophecies, one on America, in eighteen plates, the other on Europe, in seventeen; and a long series of illustrations to Dante, of which however he engraved only seven. His last performance was a likeness of his faithful wife, who, through his eccentricities reduced to the extreme of poverty, was never even inclined to complain. Blake himself never regretted his poverty: he considered himself a martyr in the cause of poetic art, and he pitied his fortunate contemporaries for their inordinate love of gain. He died on the 12th of August, 1828.

Blake lays a great stress upon drawing in his criticisms, yet there are few of his own designs which will bear even in this respect the test of criticism—his figures are heavy and ill proportioned, his outline is sharp and cutting, and the anatomical markings of his figures are exaggerated and coarse—his happiest efforts are in his conceptions, and his designs are often tinted with great taste. As to his poetic fancies, there may be various opinions; his Songs of Innocence and of Experience are more poetical than his designs, the characteristic extravagancies of which are much more the symptoms of disease than the evidences of vigour—they are the offspring of an utterly uncontrolled and undisciplined imagination, which is the secret of their supposed originality; and this want of mental discipline is the extent of Blake's madness; his reason was unimpaired, but he devoted all the other faculties of his mind to the service of his fancy. He made many designs and wrote many poems which have not been published. 'He wrought much and slept little,' says his biographer, 'and has left volumes of verse, amounting, it is said, to nearly a hundred, prepared for the press. If they are as wild and mystical as the poetry of his Urizen, they are as well in manuscript—if they are as natural and as touching as many of his Songs of Innocence, a judicious selection might be safely published.' A very elegant edition of the 'Songs of Innocence,' &c. was published in London (W. Pickering, Chancery Lane) in 1839, exactly half a century after their first appearance, with a preface containing some excellent remarks upon Blake's character. There is a good portrait of Blake by T. Phillips, R.A., of which there is a print prefixed to the notice of Blake in 'The Lives of the most eminent British Painters,' &c. by Allan Cunningham.

BLANCHARD, JACQUES, whom D'Argenville dignifies with the title of the French Titian, was born at Paris in 1600. He was first instructed by N. Bolleri, and afterwards by H. le Blanc, at Lyon. He visited Italy, and arrived in Rome in 1624, and having studied there two years, he went to Venice, where he remained also two years. He found the works of the Venetian masters more suited to his taste, and models of imitation better adapted to his abilities, than the more serious compositions of the Romans. After spending some time at Turin and Lyon, Blanchard returned to Paris an accomplished painter, and by a series of easel pictures, which followed in rapid succession, he acquired a name as a colourist without a rival in France. He had however a short career; he died of consumption, aged only thirty-eight, in 1638. He left a son, Gabriel, who became a distinguished painter. Blanchard's principal works at Paris are a gallery in the Hôtel de Bouillon, containing thirteen pictures from antient mythology, painted in oil upon the wall; and the descent of the Holy Ghost in the church of Notre Dame. The majority of his works are of small dimensions, though the figures are of the size of life: they are chiefly religious. He painted also many portraits. The old French school owed as much to Blanchard for colour as it is indebted to Vouet for design. There are about seventy engravings after the works of Blanchard, by himself and by other engravers.

(D'Argenville, *Abrégé de la Vie des plus fameux Peintres.*)

BLAND, THE REV. ROBERT, B.A., was the son of Dr. Robert Bland, an eminent physician in London, and was born there in 1779. On leaving Pembroke College, Cambridge, he became an assistant master at Harrow, where he had previously been a pupil. After several other changes, including a short residence at Amsterdam as clergyman of the English church, he married in 1813, and became a curate in Essex. He left that county however in 1816, for the curacy of Kenilworth, which he retained during the remainder of his life. He died at Leamington, on the 12th of March, 1825. Mr. Bland enjoyed an excellent reputation, not only for his knowledge and taste in the learned languages, and in French and Italian, but also for his skill as a classical teacher. His character is described as amiable and exemplary. He published two volumes of original poems, 'Edwy and Elgiva,' 8vo. 1808; and 'The Four Slaves of Cythera,' a poetical romance, 8vo. 1809. He was also the author of 'Elements of Latin Hexameters and Pentameters,' a work which has gone through several editions. He contributed to periodical publications, and was one of the translators of the Memoirs of Grimm and Diderot, 2 vols. 8vo., 1813. He is best known however for his translations from the minor Greek poets. These first appeared in a volume entitled 'Translations, chiefly from the Greek Anthology, with Tales and Miscellaneous Poems,' 8vo., 1806 (chiefly by Mr. Bland and the late Mr. Merivale); again, in the form of 'A Collection of the most beautiful Poems of the Minor Poets of Greece, with Notes and Illustrations,' 8vo., 1813; and lastly, in an improved edition with new contributions, which was published in 1833 by Mr. Merivale. [Anthology, P. C.]

BLANKET. [Woollen and Worsted Ma
P. C., p. 555.]

BLASTE'MA. [Cytoblast, P. C. S.]

BLASTING. Since the article Mining in
written, great improvements have been made in th
removing vast masses of rock in such engineerin
as relate to excavations. The article referred
describes briefly the mode in operation up to that
consisted in the insertion of gunpowder into a s
dug in the rock or stone, and firing this powder
a train and a slow-match, or by a safety fuse; h
achievements of Mr. Cubitt at the Dover cliffs h
new character to this art.

The changes which have thus been wrought
explosive material employed, but in the mode of
material, and in the vast scale which this modific
the engineer to adopt. Gunpowder is still t
agency; but a galvanic current effects the ignition
who have only a slight acquaintance with the
vanism, this igniting power is a great mystery, b
readily explained thus:—So long as a galvanic
travel along a wire uninterruptedly, its progress
harmless; but if the continuity of the wire be
anything occurs to interrupt the course for a s
intense heat and disruptive action take place at th
sufficient to ignite gunpowder if placed there.
ments therefore are such as to enable the wires
battery to come nearly in contact at the place wh
powder is deposited for blasting.

Although we have mentioned the name of M
account of the extraordinary magnitude of his
Dover, yet the employment of galvanism in blastin
rather earlier. Colonel (now General) Pasley, aft
less attempts had been made to remove the sunke
'Royal George' at Spithead, conceived that gunp
be carried down, by the aid of men descending
bell, and deposited in a water-tight vessel close
where it might be exploded by means of a gal
conducted by wires from an apparatus placed in a
distance. The Admiralty gave the requisite
July, 1839; and Colonel Pasley proceeded to f
for containing the powder, to provide electric
boats of various kinds, a diving-bell, divers with
dresses, and to make all the arrangements contin
a novel enterprise. The difficulties he met with
rous; but he conquered them one by one; an
on September 23, he succeeded in exploding
powder, contained (under water) in a cylinder
outside of the hull of the sunken vessel. A seco
2300 lbs. was fired on October 15, and the ef
explosion was to shatter considerable portions
which portions were afterwards attached to chain
by divers who went down in diving-dresses, and
up by men working at capstans above. The bra
vered by these means have a value more than ade
whole cost of the operations; and the wood r
been chiefly placed in museums, or wrought up
of curiosity. Many different explosions, and a
of auxiliary operations, were necessary to brin
result.

The application of the same agency to the blas
for engineering purposes took place for the first ti
we are aware, in 1840, by Captain Paris, an engi
ton in the United States. Excavations were mad
bed for the construction of quays and docks at tha
the removal of the submarine rock was effected
blasting. The gunpowder was used in variou
from four to sixteen ounces, enclosed in air-tight
The copper wires were inserted in the canisters
as well as the powder, were secured by a water-p
sition. A hole was drilled in the rock for the
each canister, by a workman who descended in a
and after securing the canister in the hole, and
them with a galvanic apparatus, a current explode
powder and blasted the rock. In the spring of 1
vanic method was applied, under a modification in
Mr. Roberts, in blasting the rock of a quarry nea
dral at Glasgow. In the same year some rocks
under water, to aid in the reduction of a waterfal
to Lord Panmure, on the North Esk, with the
dering it accessible to salmon. In the autumn
year, the same agency was employed in making so
tions for the new harbour at Dunbar. But the

h tested the power of the method to the fullest extent the one about to be noticed.

was in January, 1843, that Mr. Cubitt made the first great galvanic blasts at Dover. The occasion for it arose:—The six or seven miles intervening between tone and Dover exhibit a continued series of bold cliff- connected with the South-Eastern Railway; and it was t of this course that the necessity occurred for a process ting on an unexampled scale of magnitude. Proceeding Folkstone, there is first a viaduct of great height and ; then the Martello tunnel, about a third of a mile in ; then the Warren cutting, a very deep excavation, les in length; then the Abbot's Cliff tunnel, more than long; next a sea-wall, built up against the scarped face cliffs for a distance of two miles; then the double tunnel the Shakspere Cliff; and, lastly, a timber viaduct the face of the cliffs to the Dover terminus. Now in a straight line from the Abbot's Cliff tunnel to the ere tunnel for the sea-wall, it was found that a bulky tory, called the Round Down Cliff, stood directly in y. It was first attempted to tunnel through this cliff, soil being unfavourable, the idea of removing the one blast by gunpowder occurred to Mr. Cubitt the r; and there have been few examples in which a first , on a vast scale, has so fully succeeded.

arrangements for the explosion were thus made:—A tal gallery was excavated through the cliff, extending ut one hundred yards parallel with the intended line way, in a direction nearly east and west. Cross-gal- were driven from the centre and extremes of this gallery. At the end of each cross-gallery a shaft nk, having at its bottom an excavated chamber, feet long, five feet high, and four and a half wide. eastern chamber were deposited about 5000 lbs. of der, in the western 6000 lbs., and in the central ., making about 18,000 lbs. in all, or more than tons. The gunpowder was packed in bags; these re placed in boxes; loose powder was sprinkled over mouths of the bags; and the bursting charges were in the centre of the main charges. The distance of the from the face of the cliff varied from about fifty to feet. These being the underground arrangements, r firing the charge were as follow:—On the surface of nd, behind the cliff, was a wooden shed for containing lvanic batteries; each battery consisting of eighteen or Daniell's cylinders, and two common batteries of plates each. The wires from these batteries commu- at the other end by means of a very fine wire of pla- the red-heating of which by the passage of the electric would suffice to ignite the powder. The wires, covered n, were extended on the grass to the top of the cliff, n falling over the edge, were carried to the three d chambers, and placed in connexion with the charges. s were each about a thousand feet in length. All ges and entrances to the powder-chambers were ,' or stopped up with dry mud, rammed down hard.

wo o'clock in the afternoon of the 26th of January, all parations being ready, three engineers worked the three s simultaneously; the three wires conducted the elec- ent to the three chambers, and the mighty explosion ce. Many had expected that noise, smoke, and frag- hurled to a vast distance, would have accompanied the : but such did not occur. The rock seemed almost had exchanged its solid for a fluid nature, for it glided ards into the sea in one body. Sir John Herschel, in nication to the 'Athenæum' immediately afterwards, 'Of the noise accompanying the immediate explosion, I ly describe it as a low murmur, lasting hardly more than second, and so faint, that had a companion at my elbow peaking in an ordinary tone of voice, I doubt not it have passed unheeded. Nor was the fall of the cliff 400 feet in height, and of which no less than 400,000 yards were, within an interval of time hardly exceeding nds, distributed over the beach on an area of eighteen vered to an average depth of fourteen feet, and in rts from thirty to fifty) accompanied with any con- noise; certainly with none that attracted my own , or that of several others similarly stationed, with afterwards compared notes.'

complete success of such an experiment (by which it is months' time and 7000*l*. were saved to the company) ly led to the adoption of similar means in other like

On March 2, in the same year, a second blast took place, a little beyond the Round Down Cliff, on a smaller scale than the former, as the mass requiring removal was not so bulky; there were 7000 lbs. of powder used, and 50,000 cubic yards of chalk dislodged. On April 18 a third blast took place, which consumed 10,000 lbs. of gunpowder. Later in the same year, in October, a fourth blast took place, in which the powder was distributed in twenty-eight distinct parts, deposited in as many separate excavations, and all were intended to be exploded simultaneously; but from some disarrangement of the wires, some of the charges did not explode, and these were fired separately on the following day.

The same agency has recently been employed by Mr. Brunel in the cliff-works connected with the South Devon Railway, between Exeter and Plymouth. Mr. Bidwell, too, has applied it to the quarrying of rocks for road-material, at the Wrekin in Shropshire. It has in like manner been applied by Messrs. Kemp of Edinburgh, in disintegrating a large mass of stone in the quarry of Rosyth Castle, about two miles from Queensferry. Indeed it now takes rank among the most powerful mechanical aids to the engineer.

BLECHNUM, a genus of plants belonging to the natural order of Ferns and the tribe Adiantariæ. It has its thecæ in a continuous line parallel to the midrib upon the transverse anastamosing veins, and covered by a continuous scarious indusium. There is but one British species of this genus, the *B. boreale*, Hard Fern. It has barren pectinate-pinnatifid fronds, with broadly linear rather obtuse pinnæ, fertile frond pinnate, pinnæ linear acute. This plant is exceedingly common in Great Britain, and is found almost everywhere in woods, on commons, heaths, and all uncultivated ground. It occurs in every European list of plants, and has been found in Northern Africa and North America. It is the *Lomaria Spicant* of Desveux, who is followed by Mr. Newman, in his 'History of British Ferns.' Linnæus described it as an *Osmunda*. The roots of this fern are black, tough, and wiry; the rhizoma tufted and hairy.

(Babington, *Manual;* Newman, *History of British Ferns.*)

BLETTING. All ripe fruits after they have been kept for some time begin to decompose, and the spots formed on the fruit during this process have been called by Professor Lindley *blets*. During the whole time of the growth of the fruits of plants various important chemical changes go on in their tissues, especially whilst ripening. These changes have been examined with great care by Berard. At first the flesh of most fruits consists of fibrous or cellular tissue, which is mostly composed of lignine. The liquid of fruits is sap, which exists between the cells in the intercellular passages. This liquid, besides a great quantity of water, contains sugar, gum, malic acid, malate of lime, colouring matter, a peculiar vegeto-animal substance, and an aromatic secretion proper to each fruit. In such fruits as the grape there is tartrate of potash and lime; in the lemon and the gooseberry, citric acid. As the process of ripening goes on, the quantity of water diminishes, and the sugar increases. This sugar is formed at the expense of the lignine, and is either in a concrete state, as in the grape, fig, and peach, or fluid, as in most fruits. It is after this period that bletting comes on, and changes take place in the fruit which render it unfit for the ordinary uses of man. Bletting is attended with the formation of carbonic acid, the nitrogenised substance enters into a state of putrefaction, and the sugar undergoes fermentation. These processes are undergone most rapidly when the fruit is exposed to the action of the oxygen of the atmosphere. The fruits in which these changes have been most accurately observed are the pear and the apple. A jargonelle pear was found to have sustained a loss of its constituents in the following proportion:—

	Ripe.	Bletted.
Lignine ...	2·19 ...	1·85
Sugar ...	11·52 ...	8·77
Water ...	83·88 ...	62·73

It acquired rather more malic acid, gum, and nitrogenised matter.

The fact has been lately pointed out by Mr. Hassall that in all bletted fruits there exists a low form of *fungus*, which he considers the cause of the decay. He found, on inoculating sound fruits, even while growing on the tree, that he could produce immediately the process of decay, and wherever this was indicated by bletting, there he discovered the fibres of the fungus with the microscope. This appearance of the fungus however is only in accordance with what we know of the habits of fungi, whose sporules, being everywhere diffused through the air, immediately spring up where a fitting nidus is found for their growth. We find that as soon as a fruit becomes ripe its constituents commence union with the oxygen of the air, forming carbonic acid gas, and it is during this state of their elements that the fungus finds a soil ready for its development.

Whichever view be taken of the rotting of fruits, their preservation must be conducted on the same principle, for what will exclude oxygen will exclude the sporules of fungi. As a simple process it has been recommended to place at the bottom of a bottle a paste formed of lime, sulphate of iron, and water, and then to introduce the fruit, which has been pulled a few days before ripening. The fruits should be kept from the bottom of the bottle and as much as possible from each other, and the bottle should be closed by a cork and cement. In this way peaches, prunes, and apricots may be kept from twenty days to a month; pears and apples for three months. Mr. Hassall recommends that fruits should be washed over with a composition consisting of water one pound, shell-lac and borax two ounces.

(Lindley, *Introduction to Botany*; Hassall, *Transactions of Microscopical Society*, vol. i.)

BLI'GHIA, a genus of plants named after Captain William Bligh, R.N. [Bligh, William, P. C.], belonging to the natural order Sapindaceæ. It has a 5-parted calyx, five petals, a very short style, three stigmas, and a solitary seed with a very large arillus. Only one species of this genus has been described, the *B. sapida*, Akee-tree. It is a native of Guinea, from whence it has been introduced into the West Indies and South America. It is a tree attaining a height of thirty or forty feet. It has pubescent leaves, with three or four pairs of ovate-lanceolate veined leaflets. The fruit of this tree is a berry of a reddish or yellowish colour, about the size of a hen's egg. The aril of the seed is pulpy, and of a grateful subacid flavour, and is eaten in Africa and the West Indies. This tree does not produce flowers in this country. It may however be easily cultivated. It grows well in a mixture of loam and peat. Cuttings will strike in sand under a hand-glass. They should not be deprived of any of their leaves.

(Loudon, *Encyclopædia of Plants.*)

BLITUM (from βλίτον), a genus of plants belonging to the natural order Chenopodiaceæ. It has no corolla, a trifid calyx, a pistil with two styles, a single seed immersed in its berried calyx. Two species of this genus are known by the name of Strawberry Blite—*B. capitatum* and *B. virgatum*. The former has its flowers in terminal spikes; the latter has its heads lateral and scattered. Some writers have made the *B. virgatum* only a variety of the first, but its axillary flowers are constant. After flowering, the calyx of these two species swells out, and presents the size, appearance, and colour of the common wood strawberry. It is succulent, stains the hands, and was formerly used for colouring puddings. The taste is insipid. These plants are not natives of Great Britain, but are common on way-sides and in cultivated grounds in the south of Europe. The species of *Chenopodium* are closely allied to those of Blitum; and Meyer, Reichenbach, and Koch have referred the European species of Chenopodium with vertical seeds to the genus *Blitum*. These are the *C. rubrum*, *C. Bonus Henricus*, and *C. glaucum* of Babington's 'Manual of British Botany,' all three of which are Linnæan species.

(Koch, *Flora Germanica*; Loudon, *Encyclopædia of Plants*; Babington, *Manual.*)

BLIZARD, SIR WILLIAM, was born at Barnes Elms, in Surrey, in the year 1743, where his father was an auctioneer. His early education was neglected, but he was apprenticed to a surgeon and apothecary at Mortlake. During his apprenticeship he devoted himself to self-improvement, and paid much attention to botany. On leaving Mortlake, he became assistant to a surgeon in London, and attended during that time hospital practice at the London Hospital, and the lectures of William and John Hunter and Mr. Pott. His assiduity recommended him to his teachers, and he was soon elected surgeon to the Magdalen. On the decease of Mr. Thompson in 1780, he was elected surgeon to the London Hospital. About this time he connected himself with Dr. Maclaurin as a teacher of anatomy, and they lectured together, first at a small place in Thames Street, afterwards in Mark Lane, and in 1785 at the London Hospital. Imperfect as such an institution was for teaching medicine, it was the first that was established in London in connection with any of the large hospitals.

In 1787 Mr. Blizard was appointed Professor of Anatomy to the old Corporation of Surgeons, and in the year following was unanimously re-elected. He was afterward
an examiner. He was also elected a Fellow of
Society in 1787. He took an active interest in p
the old Corporation of Surgeons a new charter, w
last obtained, the new institution being called
College of Surgeons of London. By a charter
1844, it is now called the Royal College of S
England. On the granting of the first charter,
was appointed, in conjunction with Sir Everard H
fessor of anatomy. He was president of the co
during his life, and delivered the Hunterian O
times. On the occasion of the great collecti
Hunter being presented to the College by the
Mr. Blizard presented also his preserved sp
anatomy and pathology, amounting to about n
preparations.

In 1796 he published a work entitled 'Sugges
Improvement of Hospitals and other Charitable
8vo. This work pointed out the evils that existed
in the various institutions intended for the relief
Such was the want of cleanliness and attention
in many of these places, that it was questionable w
did not do more harm than good. This work of
drew particular attention to these facts, and was
a beneficial improvement in many of the metro
pitals; but such is the imperfect construction of th
and want of attention on the part of the managers
hospitals, even of the present day, are exposed to
brought against them in 1796.

In 1803 Mr. Blizard was appointed to present
to the king, from the College of Surgeons, when
the honour of knighthood. In 1819 he founde
terian Society, which has for its object the bring
medical men, and the discussion of medical topi
periods. He was the first president, and held th
successive years. This society now possesses a
and its members meet once a fortnight at th
Bloomfield Street, Finsbury. He also was the fo
Samaritan Society, which was instituted with
explaining the circumstances of cases in hospitals,
claim upon benevolence, of obtaining a fund from
might be afforded, and providing a body of me
properly execute and perpetuate the good d
society has flourished, and now dispenses 500*l*. an
relief of objects of distress. Sir William took an
in the formation of many of the metropolitan so
was one of the first fellows of the Horticultural S
was one of the founders, and for many years vice-
the London Institution.

Besides being Surgeon to the London Hos
member of the Council of the College of Surgeo
the offices of Consulting Surgeon to the Deaf
Asylum, the Marine Society, the Clergy Orph
and the London Orphan Asylum. But with all
and industry, with the exception of an attac
caught by working night and day in his diss
his health never failed him till the last. He
a long-lived family; his father and mother died
of eighty-six, and his grandmother on his moth
ninety. In 1827 he was in his eighty-fifth year,
enough to make his first visit to Edinburgh. H
latterly failed him, and when this was discovered
to cataract, he insisted, in spite of the entreaties of
on having the operation of extraction performed.
done by Mr. Lawrence in 1834, after which he
use of his eyes. He was however now in his
year, and during the following year his strength
visibly failed him, although he attended a mee
court of examiners at the college the Friday befor
He died on the 28th of August, 1835.

Sir William was tall in person, with featur
marked. He was prone to jocularity, which exhi
on various occasions, and has obtained for him a
pages of 'Joe Miller.' He was most punctiliou
of etiquette, and retained the fashions of the las
the day of his death. At one time it was customa
sicians and surgeons to attend at coffee-houses to b
Sir William Blizard is said to have been the last
in the metropolis who pursued this practice. H
frequented, for this purpose, Batson's coffeehouse,

In early life, Sir William, in politics, was a gre
He regularly contributed to many of the periodi
day, under the signature of Curtius. Some of the

l in the 'Middlesex Journal, or Chronicle of
the 'Freeholders' Magazine, or Monthly Chro-
y.' As he grew older however, and his position in
'ed, be became less democratic, was an admirer
ad a member of the Pitt Club. Subsequently,
of a member of the Council of the College of
was an opponent of all change in that body.

n, Sir William Blizard never took the highest po-
ıy, but he was a good anatomist. His contribu-
cal literature are few, and, considering the vast
he must have had of witnessing all forms of
of the largest hospitals in London, not so import-
as might have been anticipated. His principal
1, A new method of treating the Fistula Lachry-
rans., vol. lxx. 2, 'Experiments and Obser-
external use of Tartar Emetic,' 1787. 3, 'Ob-
the uses of Electricity in Deafness,' 1790.
the Scholars of the Maritime School at Chelsea,
n of the large blood-vessels of the extremities,
use of the tourniquet,' 12mo., 1798. This
ith the view of affording sailors some knowledge
be done in cases of emergency from wounds of
5, 'Observations on some epidemical effects,'
unterian Orations,' 1815, 1823, 1828. 7, Ora-
before the Hunterian Society, 1819. 8, 'An
Chairman and Members of the House Com-
London Hospital, on the subject of Cholera,'
sultory Reflections on Police, with an Essay on
preventing crimes and amending criminals,'
s an excellent essay, and contains some severe
on the system of police at the time when it was

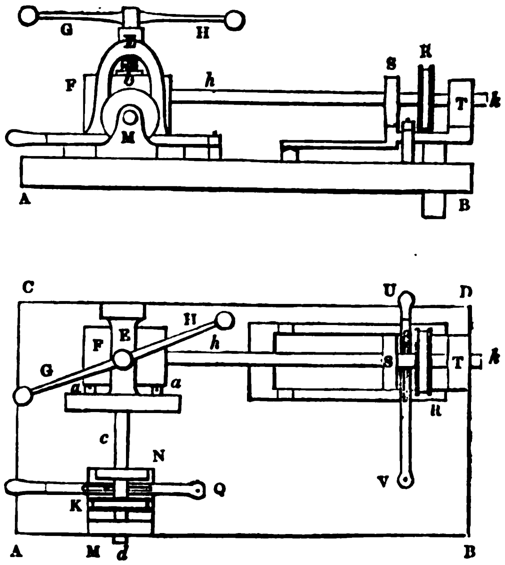
ls for this notice have been chiefly selected from
moir of Sir William Blizard, Knt.,' by W.
.S.

IACHINERY. The assemblage of machines
inventive genius of Mr. (now Sir Mark Isam-
for the formation of the blocks employed in
ns, and particularly in the important service of
ging of ships, contains so many ingenious pro-
ıing the proposed ends with the utmost accu-
ne same time, with the least possible labour, as
opinion that it constitutes one of the noblest
chanical skill; and, in this article, it is intended
description of the principal parts of which it is

es may be said to consist of many saws and
se the work is performed, from the operation
log of timber, to that of polishing the pins on
eys turn; and motion is communicated to all of
le steam-engine.

aw worked backwards and forwards, horizon-
ngine, cuts off in succession different portions
om the log of timber (elm) which, for this pur-
to rest on a table or low bench; the portions
f the proper lengths for the dimensions of the
s. For the smaller logs a circular saw is used;
e transversely, and consequently its plane is
to the axis of the latter: the saw is capable of
rtically, or moved horizontally, at pleasure, in
ay be made to enter the wood above or below,
le.

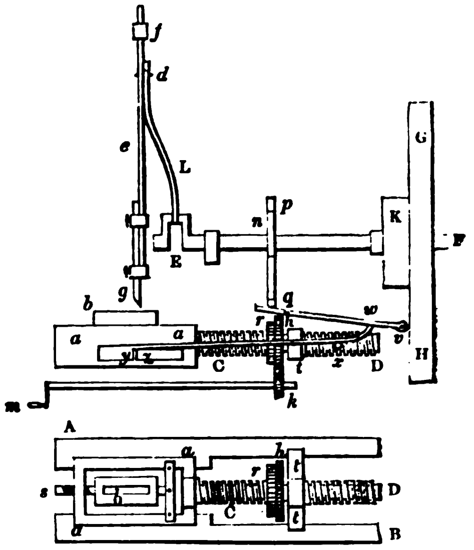
g has been cut in slices, the latter are brought
ed the ripping saw: this is circular; and its
vertically, in part above the level of the table,
the slices into rectangular parallelopipeds. In
wood is brought to the boring machine, which
scribed (the lower figure representing the plan,
a side elevation):—



le A B C D represents the surface of a strong
h is fixed an iron frame E having three legs;
the parallelopiped F is placed between three
two of which appear at *a a*, and it is rendered
uring the operation by means of the screw *b*;
turned by the iron bar G H. *c d* is one of the
turns on its axis by means of the pulley K, the
g motion from the engine: this borer rests on
N, which is capable of being moved towards the
pressing on the end P of the lever P Q, so as
ut the pivot Q. *h k* is another borer, which
is by means of the pulley R, the latter also re-
ı from the engine: this borer rests on the frame
capable of being moved towards the frame E by pressing on the handle U V, so as to turn it about the pivot V.

The former borer makes the hole for the pin on which the sheaves of the block are to turn; the other merely makes a perforation at a spot which is to form one extremity of the mortise intended to contain a sheave. If the block is to contain two or three sheaves, the borer is to make as many perforations, the frame S T being capable of moving in a direction parallel to B D, in order that the point of the borer may be placed where the required perforations are to be made.

A remarkably ingenious machine is employed to cut the mortises in which the pulleys are to turn; and it is hoped that the following cut and description will suffice to render the process intelligible. A B is a representation of the horizontal surface of the table or stage on which the block is placed; and the diagram above it exhibits a side elevation of the acting part of the machine, the pillars and braces which support it being omitted, as they would have concealed, in part, the apparatus. *a a* is a frame made to contain the block



b which, in the diagram, has but one mortise; the block is tightly fitted in this frame by means of the screw *s* at one extremity, and the frame is capable of being moved along the stage from *s* towards *t t*, as much as the whole length of the intended mortise. The great screw C D is fixed at one extremity to the frame which contains the block, and works in a concave screw which is cut in the transverse piece *t t*, the the latter being fixed to the table or stage.

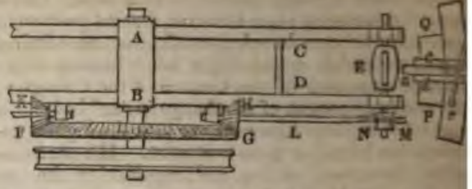
E F is an axle which terminates with a crank at E and carries at the opposite extremity the fly-wheel G H, the revolving motion being communicated from the engine by a strap passing over the cylinder K. The circular motion of the crank at E produces by means of the bent rod L, which turns on a joint at *d*, a reciprocating motion vertically in the rod *e* which passes through a collar at *f*: to the lower part of this rod is made fast the steel chisel *g* by which the mortise is to be cut; and it may be easily understood that, if two or three mortises are to be cut at the same time, as many chisels may be fixed, in line, parallel to one another, in a frame which is carried by the rod *e*. On the screw C D is a toothed wheel *h*, and below it is a small wheel *k* which can be turned round by means of the handle at *m*, and thus a small motion may be given to the frame *a a* in order to bring the hole previously bored in the block vertically under the chisel *g*. The axle E F carries an excentric wheel *n* (seen edgeways), on the circumference of which rides one extremity *p* of a bent lever *p q*, the lower branch of which lies tangentially on the top of a ratchet wheel *r*: the inferior surface of this branch has a notch, the sides of which, by the movement of the excentric wheel, are made to act on a tooth of the wheel *r*; and thus, the axle C D being turned, the frame *a a* is moved a little way towards the cross-piece *t t*. This movement always follows immediately after the chisel has made a descent, and thus there is presented a new part to be cut out from the block. Since the chisel goes quite through the block at each descent, and the movement is very rapid, the mortise is quickly made.

The extremity *q* of the bent lever *p q* rests upon a lever whose fulcrum is at *v*, and this rests at *w* on the bent lever *w x y* whose fulcrum is at *x*, and when by the motion of the frame *a a* the notch at *y* falls over the extremity *z* of a projection on the side of the frame, the notch in the branch *q* is lifted above the top of the wheel *r*, and the mortise being completed, the frame with the block moves no further. The cylinder K is hollow, and within it, upon the axle E F, is a cone which, while it turns with the axle, is capable of being moved backwards or forwards on the latter by means of a lever not shown in the cut: when this cone is thrust as far as it can go into K, the friction is great enough to allow the axle to be turned with the fly wheel and cylinder; but, on drawing the cone towards E, its surface is disengaged from the interior surface of K, so that the axle E F no longer moves with the fly wheel. It is while the axle ceases to revolve that the mortised block is removed, and one on which the operation is to be performed is put in its place.

The block is subsequently submitted to the action of a circular saw, by which the corners are cut off, and it is made to assume the form of an octangular prism: in this state it is removed to what is called the shaping machine, in order to be reduced to the requisite figure.

The shaping machine consists of two wheels connected together and turning on the same horizontal axle: they carry between the interior surfaces of their rims ten blocks at equal distances from one another on the circumference; and at first the blocks are disposed so that the mortises in each are perpendicular to a plane passing through the common axis of the two wheels, the axes of the blocks remaining always parallel to that axis. The wheels are made to revolve by a strap passing over a cylinder on the axle; the cylinder being in connection with the steam-engine: the cutting tool is applied, on a level with the axis of the wheels, to a horizontal frame which has the form of a circular arc, the centre being in the middle of that axle; and while the edge of the tool is pressed against the block it is slowly moved along the arc. Thus, the tool acting against the block during the revolution of the latter with the wheel, and being itself in motion horizontally, the face of the block is brought to the form of a segment of a sphere. Each block is then turned on its particular axis: first one quarter round, then another quarter, and finally a third quarter round: and in each of these positions an edge or side of the block is, by the tool, brought to a form similar to that which was given to the first face; the last of the four sides being completed after each block has been turned three quarters round on its own axis. The ten blocks are then removed and ten others put in their places, to be shaped in like manner.

The blocks are not turned on their several axes by hand, the machine containing an ingenious contrivance by which such revolutions are effected. In the following cut, A B is the axle of the double wheel, of which A C, B D represent two of the radii, and E one of the blocks at the circumference. A bevilled wheel F G is fitted on the axle of the double wheel, and, in the teeth of this, work as many pinions, H, K, &c., as there are blocks; each pinion has an axle L M in the direction of a radius of the great wheel, and extending as



far as the circumference of the latter; near the ext is cut what is called a perpetual screw, whose thr in the grooves of a pulley-shaped wheel N, on th which is the block E.

During the process of shaping the blocks, the w revolves with the great wheel, carrying with it th H, K, &c., and their axles L, M, &c., the pinions n ing their places on the circumference of F G, an quently the blocks having no movements on their axles. But when the first faces of the ten blocks h shaped, the whole machine is detached from the en the wheel F G, which is capable of turning freely o of the great wheel, being held fast, the latter is tur by hand; this causes the pinions H, K, &c. to mo circumference of F G, and, at the same time to r their own axes; thus the axles L, M, &c. revolve account of their connection at N, &c. with the ax blocks, the latter revolve also on their axes. The of the teeth are so proportioned that four revolutio great wheel, while F G is held fast, will cause each turn a quarter round on its own axle; this brings a of each block to the circumference of the wheel whole machine being then re-connected with t engine, the process with the tool is again carried o new side of the block is shaped; the machine is leased from the engine, the blocks turned as befo quarter round, and so on.

The part *a b* represents the shaping tool, wh between the two plates *c* and *d* of a frame which i slide upon the circular arc PQ towards either of its e by moving the handle R; and while the tool is th move slowly on the arc, it is kept close to the block b on the handle S, which turns on a pivot at *e*, agai at *b*.

Lastly, the blocks are taken to what is called th machine, by which there are cut on each of the fac grooves intended to receive the rope by which the b be suspended when in use: this operation is perf means of two cutting tools, with curved edges, fit opposite extremities of a small brass wheel which r an axle by the connection of the latter with the stea the block is fixed in a frame in an inclined position, cutting tools form a groove which commences pin-hole of the block and deepens gradually towa extremity.

The sheaves are made of lignum vitæ, and plat required thickness being cut from the tree, each has a circular form given to it by means of a trep crown saw, a cylinder of steel having teeth on one of and having on its axle a tool for boring the centre hol which the pin is to pass; the plate of wood being fi place, the workman by a lever presses the saw and against it; and these by revolving rapidly, both give form to the plate and bore the hole in its centre.

The sheave is then to be prepared to receive in the metal *coak* or ring through which the pin is to this purpose it is laid horizontally on a plate, whi kept at rest, or turned round on its axis, as may be a drill, or cutting tool, in a vertical position, is mad in succession three semicircular excavations of small equal distances from one another about the cen During the cutting of each of these the plate ca sheave is fixed, but in each interval it is turned one- round, by which means the tool is enabled to en centre hole to a small depth, quite round the latter; side of the sheave is countersunk about its centre in of a circle having three segments cut in its circumfer like countersinking then takes place on the other si sheave. The coak, which is made of gun-metal form to fit the countersink, is in two parts, one having a barrel which is to enter the centre hole; are then introduced and riveted to the sheave. Th part of the coak is then broached out so as to form a

drical; and, lastly, by a lathe also connected with
the groove for the rope is formed round the cir-
of the sheave.

s, which are of iron, are turned in a lathe of great
and are highly polished by being drawn with a
notion between two plates.

as been said cannot be considered as a complete
of this very ingenious and complex machinery, but
revent us from going more fully through the details.
lete assemblage of the machines was, under the
f Mr. (Sir M. I.) Brunel, executed, in 1804, by
. Henry Maudeslay, at Portsmouth; and a second
d, in 1807, in the dockyard at Chatham.

PETER OF. [Peter of Blois, P. C.]

), or BLON, JACQUES CHRISTOPHE LE,
painter, born at Frankfort in 1670, known as the
printing in colours. He appears to have been
Rome as early as 1696, and he probably lived
years. Before 1711 he was practising as a minia-
with great success in Amsterdam, but he executed
of so small a size that he injured his eyes, and he
to give up that style. He then took to oil painting,
d several good pictures in that style also; but he
have soon afterwards turned his attention to print-
urs. He anticipated great results from his dis-
removed to Paris as a larger field of operation, but
that encouragement which he expected, he came
Here he found ready subscribers to his novel
ure painting. Those however whom his represen-
persuaded to venture money in the scheme were
disappointed in the results. His prints were flat
and gave but very faint copies of their originals;
however efforts of great merit and great novelty,
ore perseverance than Le Blond possessed, much
have resulted. Le Blond however, disheartened
ness with which his prints were received, and a
bankruptcy, neglected the discovery, and turned
to a new scheme—the weaving in tapestry of the
Raphael.

of printing was very simple, too simple to produce
sed only the three primary colours, and passed the
times through the press, printing with one colour
the secondary and tertiary colours were obtained by
colour over one or both of the other two primary
the impression was repeated for those parts where
was necessary: they were first engraved in mezzo-
ublished an account of his plan in 1722, in French
, in 4to., entitled 'Il Colorito, or the Harmony of
n Painting, reduced to Mechanical Practice, under
ts and infallible Rules,' with five examples, and
to Sir Robert Walpole. A second edition was
n Paris, in 1756, after the death of Le Blond, by
pupils, under the title 'L'Art d'Imprimer les
Le Blond executed altogether in this style
plates, many after the great masters, and all very
e of the portraits, which are a considerable propor-
large as life; they are extremely scarce.

d found also much assistance towards the com-
of his undertaking regarding the Cartoons of
ut it was so inadequate to the full accomplishment
stries, that after he had spent all that was advanced,
hopelessness of persisting; and in about 1737 he
and went to Paris, leaving his friends the partly
pparatus as the indemnity for their outlay. In
gain had recourse to his printing in colours, for
ook out a patent in 1740, but he produced only two
e enterprise failed, and he himself is said to have
hospital in 1741. He instructed some pupils in the
rried it on after his death, but with little success.
, published an account of the process in an edition
n Bosse's book 'De la Manière de Graver,' &c.,
; and it is noticed in the 'Oeuvres Posthumes de
lly.' An artist of the name of Admiral, one of
reputed pupils, was more successful than Le Blond,
d the process to anatomical plates, a style of work
t is fully applicable. He published six anatomical
msterdam and Leyden, between 1734 and 1741,
of insects a few years later.

en, *Idée Générale d'une Collection d'Estampes*,
naire des Artistes, &c.; Hüsgen, *Artistisches Ma-*
ber, *Manuel des Amateurs*, &c.; Strutt, *Diction-*
ngravers; Fiorillo, *Geschichte der Zeichnenden*
.)

BLOW, JOHN, Mus. Doc., was born at North Collingham, Notts, in 1648, and educated in the Chapel-Royal, where he very early distinguished himself by his activity and enterprise, for it appears, from Clifford's 'Collection,' that while one of the 'children' of that royal establishment, he composed several anthems, which had the honour to be performed before the king. His advancement was rapid, and he became the greatest musical pluralist that the history of the art records; for he was successively appointed to the offices of Gentleman of the Chapels-Royal and Master of the Children; one of the King's Private Musicians; Composer to the same; Almoner and Master of the Choristers of St. Paul's Cathedral,—and Organist of Westminster Abbey. Part of these duties must have been executed by deputy, and, most likely, part neglected. He died in 1708, and was interred in the north aisle of Westminster Abbey, where a monument is erected to his memory, on which is engraved his famous '*Gloria Patri*,' a canon, together with a long inscription, wherein it is stated, and to his honour, that he was 'master to the famous Mr. H. Purcell.'

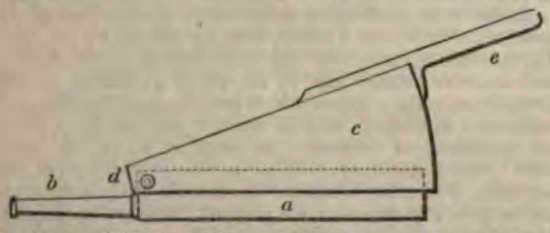
Dr. Blow was remarkable for the elegance of his person and address, to which may, in some measure, perhaps, be ascribed his lion's share in the musical offices of his day. His compositions are numerous, but more the offspring of study and patient labour than of genius. Two of his anthems however prove that he was sometimes inspired by the muse presiding over his art. And a few of the many secular compositions in his 'Amphion Anglicus,'—a volume of songs, &c.—were deservedly popular during his life, and are worth revival. One anecdote of him, given by Sir John Hawkins, shows with what intrepidity he could rebuke a favourite of the court to which he belonged, and whom he viewed as the enemy of his religion. In the chapel of James II., an anthem, by some Italian master, had been introduced, which the king, liking very much, asked Blow if he could make one as good. Blow answered in the affirmative, and the next Sunday produced the fine anthem, 'I beheld, and lo! a great multitude.' When service was over, the king sent Father Petre to tell the author that he was much pleased with it. 'But,' added the popish confessor, 'I myself think it too long.' 'That,' answered Blow, 'is the opinion of but one fool, and I heed it not.' The Jesuit was so displeased at this unceremonious assault, that he determined on revenge, and persuaded the king to put the composer under suspension; from which however he was soon released by the Revolution, which took place shortly after.

BLOWING-MACHINES, or machines for producing a current of air for the purpose of exciting the requisite intensity of combustion for metallurgical and other operations which require great heat, are a class of contrivances only slightly alluded to in the article Bellows (P. C., p. 198), but which, from their great importance and very general use, demand further explanation.

The kind of blowing-machine to which the name of *bellows* is usually applied consists of an air-tight chamber of variable dimensions, having one aperture closed by a valve which can open only inwards, and another, which is connected either directly or indirectly with the nozzle, or pipe for the exit of the current of air, closed by a valve which can only open outwards. When, by the application of mechanical force, this chamber is distended or enlarged, the pressure of the external air opens the valve which opens inwards, and consequently the chamber becomes filled with air; but when, by an altered application of power, the chamber is compressed so as to reduce its capacity, the condensation of the included air causes the valve by which it entered to close, and that which opens outwards to open, so that the air escapes by the nozzle, with a degree of force and rapidity proportionate to the pressure employed in compressing the chamber. The leathern bag of the musical instrument called a bagpipe is an example of such a variable, or expansible and compressible, chamber, and would therefore, if fitted with a nozzle, form a substitute for the common domestic bellows; but the same effect is produced, in a much more convenient way, by the use of a chamber formed of two boards, the edges of which are connected by pieces of leather laid in folds in such a manner that the upper board may be raised or depressed at pleasure, while the lower board remains stationary. Of the precise arrangement of the parts alluded to in hand-bellows for domestic use it is unnecessary to give any account: we proceed therefore to explain some of the principal modifications of form and arrangement in large bellows employed for forge-fires and furnaces.

The blast produced by such a machine as has been described is intermittent, and also variable in intensity. The first of these defects may be remedied by the device mentioned in **Bellows**, P. C., of employing two separate bellows or pairs of bellows, worked alternately, so that the one may be expelling air while the other is drawing in a fresh supply. While, however, the blast thus produced is continuous, it is by no means equable in force, to remedy which defect the air expelled from the chamber already described should be forced into a second chamber also of variable dimensions, but compressed by a weight so as to produce a constant steady pressure, and the nozzle should be made to open into the second chamber. In forge-bellows of this construction there are three boards, connected by leather sides which are kept in regular folds by hoops of cane. The middle board is fixed in a horizontal position, and has the nozzle attached to it, while the upper and lower boards are moveable, and loaded with weights, the effect of which is that when the machine is at rest the chamber formed between the upper and the middle boards is collapsed, while that between the middle and the lower boards is distended and full of air. When in use the lower board is raised by means of a lever and chain, and the air inclosed between it and the middle board is forced through a valve into the upper chamber; and by the rapid repetition of this action the upper chamber is filled with air more rapidly than the nozzle can carry it off, so that the upper board rises. The working of the bellows may then be suspended for a time, as a continuous and equable blast will be maintained by the pressure of the loaded upper board until it has, by the complete expulsion of the air, descended to its original position. It should be remembered that this perfect equability of blast is only maintained while the working of the bellows is suspended, because during that time the blast is produced solely by the pressure of the loaded board; while, during the working of the bellows, the pressure alternates between that and the superior pressure produced by the influx of air from the lower chamber, thereby causing the upper board to rise and fall with each stroke. Many smiths' bellows are made of the pear-shaped form common to hand-bellows, and have the boards, or at least the lower and middle boards, united by a kind of hinge-joint; but the superior machines of this description have the boards circular, and the working apparatus so arranged as to make their action parallel; and in some cases, as for portable forges, helical springs are applied to the boards in lieu of weights.

Beckmann, in an article on the invention of bellows (*History of Inventions*, English edit. of 1814, vol. i. p. 105), observes that large bellows, such as were formerly used in smelting-houses, when made with leather, were attended with many inconveniences. They require careful management and expensive repairs, and wear out after a few years' use, and the leather needs to be frequently greased or oiled, in order, if it be thin, to prevent the enclosed air from passing through it, or, if thick, to keep the leather soft and pliable, and prevent it from cracking in the folds. These defects led to the invention, apparently in Germany, in the sixteenth or seventeenth century, of bellows formed entirely (excepting the nozzle and hinge-joint) of wood, which were long used in metallurgic operations on the Continent, and appear, from what Beckmann says as to their efficiency, to be well adapted for use where more perfect machines are unattainable. The annexed cut, representing a side elevation of such an apparatus, will sufficiently explain the structure of wooden bellows. In this figure *a* represents a wooden box of an oblong square form, the upper edge of which is indicated by dotted lines. It is open at the top, and from one end of it proceeds the nozzle *b*, which, as well as the bottom board of the box, is supplied with a flap-valve, like common bellows. This box is fixed in a horizontal position, and is covered by the box *c*, which is open at the bottom, and is so much larger than *a* as to allow its sides to slide up and down outside the sides of the lower box without actual contact. The two boxes are united at the nozzle end by a hinge-joint formed by the bolt *d*,



and the upper box is capable of being worked up
by the projecting handle *e*. Great friction would
sioned if an attempt were made to obtain a close
accurate adjustment of the boxes one to the oth
would be impossible, in consequence of the shrin
warping of the wood, to make the machine air-tight
difficulty is obviated by attaching thin slips of w
inner sides of the box *c* in such a manner as to
space between the two boxes; such slips being
very flexible by cutting them nearly through with
intervals of fifteen or eighteen inches, and being p
close contact with the sides of the box *a* by small met
The same object might be readily effected by slips
Wooden bellows of this construction are both che
ceedingly durable, the slips or laths which render
tight being the only part liable to wear, and
easily replaced. Though we find no notice of suc
fication of them, a very trifling exercise of ingen
be sufficient to form double bellows of this simple
In the article **Organ, Construction of** (P. C.,
a representation of a similar apparatus applied
bellows; and by turning to **Williams** (P. C., p.
reader may find a case in which the application
bellows to a smith's forge would have been peculiar
The machine invented by Mr. Williams, in the
information respecting such contrivances, consist
square boxes containing pistons that were altern
by levers, and suffered to fall by their weight, aide
of stones; the whole forming a rude imitation of t
blowing-engines now used in iron-works, rather
we should call bellows.

A very different kind of blowing-machine, wh
to be of French origin, and has been much used
furnaces on the Continent, and also, we believe, in
States of North America, though it does not appear t
much adopted in this country, is the water blow
otherwise called *trombe* or *trompe*, in which water
to fall in a minutely divided stream by passing thr
lender, or by some other contrivance, down a lar
the sides of which, near the upper end, are sever
for the admission of air. In so falling the water
it a great quantity of air, which passes with it into
the bottom of the pipe, where the water dashes up
tal which disperses it through the vessel. By this
separation of the air and water appears to be faci
consequently the air collects in the upper part of
whence it is conducted by a pipe to the furnace,
water escapes by apertures provided for the pur
lower part of the vessel. The action of this kind
engine, which is represented in several different
been variously explained by different writers, and th
current of air produced by it has been compared t
which accompanies violent showers of rain. It is
remark, as probably indicative of the origin of its n
also of the invention of this apparatus, that its Fr
trombe is the same as that of the meteorological p
which we call a water-spout. For fuller particulars
may consult Dr. Ure's *Dictionary of Arts*, art. 'M
pp. 824, 825; Brewster's *Edinburgh Encyclo*
'Blowing-Engine,' and the *Encyclopædia Brita*
'Hydro-Dynamics,' vol. xii., p. 106, of the sevent

The great improvements which have been effec
iron manufacture within the last century are, in a
sure, due to the introduction of very powerful bl
chines, in which the air is alternately drawn into an
from large cylinders, resembling those of a steam-
the action of pistons impelled by a connection
wheels or steam-engines. The first blowing-m
force-pumps of this character on a large scale wer
the Carron foundry, constructed by Smeaton, and
in the year 1760. The arrangement of the piston
is so similar to that of a steam-engine cylinder as t
detailed description. In some cases, where ste
moving power, the piston-rod of a double-acting
cylinder (in which a blast is produced by every st
ther upwards or downwards), is connected directly
vibrating beam of a steam-engine; in others the
transmitted through a series of cranks, so that two
four blowing-cylinders may be worked in successio
generally force the air into an air-chest of large d
which is usually formed of iron, but sometimes of

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* In Brewster's *Edinburgh Encyclopædia*, art. 'Blowing-Machi
air-vault, at one of the Devonshire iron-works, is described as

hich it is conducted to the blast-pipes, which are
res or *tweers*. Barlow, in his 'Treatise on Ma-
l Manufactures,' part of the *Encyclopædia Metro-*
escribes a very powerful blowing-machine at Wool-
yard, in which four cylinders supply air, at a
a quarter of a pound to the square inch, to a large
om which pipes extend to all the forges and fires
hy, the pipes being supplied with cocks by which
an be turned off or on at pleasure. To ensure
f pressure, a regulating cylinder, with a piston
he required pressure, is used, and whenever the
ceeds the proper amount, it raises the piston, and
pes like steam from a safety-valve. Owing to the
ing instead of clack or flap-valves in the blowing-
his machine works very quietly. Another mode
g the blast is to throw the air from the cylinders
iron box inverted in a cistern of water, and some-
ling a gasometer, but so fixed as to be incapable
The effect therefore of the condensation of air
s to force some of the water out, and the differ-
the level of the water within and without the
easure of the degree of condensation or pressure.
an apparatus care must be taken to conduct the
high a level as to render the forcing of water
ce impossible. The blast thus produced is ex-
d, which is a great disadvantage in a smelting-
r a notice of the advantages of a hot blast see
(p. 33).

bellows is a simple kind of blowing-machine the
which we have seen attributed to Hornblower,
rly English improvers of the steam-engine. It
o iron boxes, or hollow vessels with their under
spended from the opposite ends of a vibrating
ling that of a steam-engine. The lower edges
ls dip into two cisterns of water, within which,
the surface of the water, are pipes connected
t or air chamber. When, by the motion of the
the vessels is forced down into the cistern, it
e air enclosed between it and the surface of the
nsequently forces it along the blast-pipe. The
meanwhile, as it rises, admits a fresh supply of air
lve which opens inwards, and this air is forced
-pipe in like way when the action of the beam is
other machine of similar character, but still more
ists of a cask or cask-like vessel suspended on an
rizontal position, so as to be capable of an oscil-
. This cask is divided longitudinally by a ver-
n, reaching from the top very nearly to the
is about half filled with water. When the cask
ittle upon its axis, as the water retains its level,
e side of the partition is condensed, and escapes
lve into a pipe which conducts to the air-chamber
while, owing to the enlargement of the space on
side of the partition, air enters it through a valve
ards. On reversing the inclination of the cask,
eversed, and the air which entered before is ex-
e a fresh supply is drawn in on the opposite side of
. This is the most simple form of the apparatus,
perfect and more complicated machines are con-
the same principle.

in the 'Treatise' above cited, describes a simple
l blowing-machine used at Sharp and Roberts's
ufactory, at Manchester, which may be compared
EW OF ARCHIMEDES (P. C., p. 110), excepting
l of raising water, its object is to impel air. It is
ersed in a reservoir of water, and is turned by a
e. To this treatise, sections 383—385, and to
lopædia Britannica, arts. 'Blowing-Machines'
matics,' we may refer for further information on
of this article. The last-mentioned work con-
ription of a well-contrived substitute for a cylinder
engine, called Vaughan's blowing-machine, in
required effect is produced by the backwards and
otion of square pistons in two oblong boxes,
by side, each of which may be compared to a
g cylinder. This contrivance is based upon the
s used by Chinese smiths. Blowing-machines in
urrent is produced by means of fanners are noticed in BELLOWS, P. C., and their application to steam-carriage furnaces is alluded to in STEAM-CARRIAGE, P. C., p. 491.

BLUMENBACH, JOHANN FRIEDRICH, was born at Gotha, on the 11th of May, 1752. He studied medicine, successively in the universities of Jena and Göttingen, and took his degree at the latter place in 1775. He chose for the subject of his inaugural dissertation the varieties of the human race. It was published at Göttingen with the title 'De Generis Humani Varietate Nativa,' 4to. 1775. This essay appears to have laid the foundation of many of his important investigations on this subject in after-life, and led to the formation of his collection of the skulls of all nations, which is one of the most extensive in existence. New editions of this dissertation appeared in 1776, 1781, 1793, and 1795. In the last edition a letter was added, addressed to Sir Joseph Banks, on the subject of some mummies which had been opened in London. The last edition of this work was translated into German by Gruber, in 1798, and into French by Chardel, in 1804.

In 1776, the year after taking his degree, Blumenbach was appointed extraordinary professor of medicine in the University of Göttingen, and in 1778 he was made ordinary professor. At the same time he also received the appointment of superintendent of the library and museum of natural history in the university. From this time his contributions to the sciences connected with medicine, especially anatomy and physiology, became regular. In physiology he pursued the path of Haller, and directed his attention more especially to the structure and functions of the lower animals, as a means of determining the true laws of human physiology. After the publication of his inaugural dissertation, his next work was an anatomical essay on the frontal sinus, entitled 'Prolusio Anatomica de Sinibus Frontalibus,' 4to., 1779. In 1781 he published a work on embryology, entitled 'Ueber den Bildungstrieb und das Zeugungs-geschäft,' 8vo., Göttingen. In this work he threw much light on the obscure subject of generation, and opened up a path for future inquirers. New editions of this work appeared in Germany in 1789 and 1791. It was translated into Dutch in 1790, and an edition, translated by Sir Alexander Crichton, appeared in English in 1793. In 1786 appeared his work on the human bones, with the title 'Geschichte und Beschreibung der Knochen des Menschlichen Körpers,' 8vo., Göttingen. He also published, in Latin, in the same year, an introduction to medical literature, with the title 'Introductio in Historiam Medcinæ Litterariam,' 8vo. Göttingen.

In the year 1787 he published his 'Institutiones Physiologicæ,' 8vo., Göttingen. This work was written in Latin, and was one of the first attempts that had been made to give a condensed account of the functions of the human body, without entering into the minute anatomical structure of the body. It quickly became the text-book of schools where physiology was taught. German translations by Eyerel and Beck appeared in 1789 and 1795. New editions of the original work were published in 1798, 1810, and 1821. It was translated into Dutch by Wolff, in 1791, and again, by Vosmaer, in 1808. An English edition, translated by Dr. Caldwell, appeared at Philadelphia in 1798. A French translation, by Pugnet, appeared in 1797. A second English translation, by Dr. Elliotson, was published in London, in 1817. A second edition of this translation was published in 1818, and is remarkable as being the first work that was ever printed by steam-machinery. Several subsequent editions of this translation appeared with copious notes by the translator, and these at last were so numerous, and the progress of physiology required so much of the original to be modified, that the translator published the last edition of this work with the title 'Human Physiology, &c., with which is incorporated much of the elementary part of the Institutiones Physiologicæ of J. F. Blumanbech, by John Elliotson, M.D.'

Blumenbach, in all his contributions to physiology, had frequent recourse to the lower animals for the purpose of illustrating and developing the functions of those of the higher; and in 1805 he was induced to publish a manual of comparative anatomy. This work appeared at Göttingen, with the title 'Handbuch der vergleichende Anatomie.' Editions of it appeared, in German, in 1815 and 1824. It was translated into English in 1809, by Mr. William Lawrence, surgeon, who, after John Hunter, was one of the earliest cultivators of comparative anatomy in connection with the study of medicine in this country. It was again translated into English by Mr. Coulson, and published in 1827. Although this work is meagre compared with those which have ap-

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, 72 feet long, 14 feet wide, and 13 feet high, and containing
bic feet of air. In the article referred to, it is proposed that
hould contain about 100 cylinders' full of air, and that, of course
the air which naturally fills it, about 25 cylinders' full should
fore the tuyeres are opened.

peared both in this country and on the Continent since its first publication, it yet exerted an important influence on the systematic study of comparative anatomy, embodying as it did the results of previous observers, and the author's own labours in this department of scientific inquiry.

One of the results of the author's inquiries with regard to the varieties of the human race was the collection of a large number of skulls of the inhabitants of the various parts of the world. In 1791 he commenced the publication of a work in parts, containing descriptions and illustrations of these skulls. It was entitled 'Decas Collectionis suæ Craniorum diversarum Gentium illustrata,' 4to., Göttingen. This work extended to several volumes, and was finished in 1808. Although through this work the most important forms of the casts and skulls in the collection of Blumenbach are thus preserved, yet it is to be regretted that so valuable a repository should be suffered to fall into decay through want of care, as is at present the case with this collection at Göttingen.

Besides his large works, Blumenbach was the author of many small ones on particular departments of medical and physiological inquiry. In 1790 he published a paper in Meyer's Magazine on the comparative anatomy of warm and cold blooded animals; in 1794, a paper on Egyptian mummies opened in London; in 1813, a memoir of Augustus Gottlob Richter. He wrote prefaces to several translations of works into German, amongst others to the Works of Cheselden; the 'History of Poisons,' by Gmelin; 'Medical Logic,' by Blane; the 'Nutritive Organs of Mammalia,' by Neergaard. His papers in various periodicals are numerous, and on almost every subject connected with medicine. The titles of some are as follows:—'On Dragon's-blood;' 'On Wintersbark;' 'On Nutrition;' 'On the Reproduction of Bones;' 'On the Vital Principle of the Blood,' &c.

In 1783 Blumenbach visited Switzerland. During this journey he made notes on the medical topography of the districts through which he travelled, and afterwards published them in his 'Medicinische Bibliothek,' a work which he edited at Göttingen from 1780 to 1794. He visited England in 1788, and again in 1792. In 1812 he was appointed secretary to the Royal Society of Sciences at Göttingen. In 1816 he was made physician to the king of Great Britain and Hanover, and in 1821 was made a knight commander of the Guelphic order. In 1831 he was chosen a member of the Academy of Sciences in Paris. The jubilee of his graduation was celebrated by the University in Göttingen in 1825, and the jubilee of his professorship in the following year. On the former occasion a medal was struck in honour of the event. He died on the 22nd of January, 1840. It will however be seen that for many years he had ceased to labour in the cause of science, and that for a long time previous to his death the University of Göttingen could only boast of his illustrious name. Schräder has named after him a genus of plants *Blumenbachia*.

(Kallisen, *Medicinisches Schriftsteller-Lexicon*; *Lancet*, 1840; Blumenbach, *Works*.)

BLUMENBA'CHIUM, a genus of fossil alcyonoid Polypiaria, proposed by Dr. König.

BLYSMUS, a genus of plants belonging to the natural order Cyperaceæ. The glumes are fertile, the outermost the largest, and empty; bristles three to six; style not thickened at the base, persistent, but plano-convex, tipped with the undilated base of the style; the spikelets bracteated, alternate, forming a close distichous compound terminal spike. Two species of this inconspicuous genus are found in Great Britain. *B. compressus* is found in boggy pastures in England and Scotland. *B. rufus* inhabits marshes near the sea on the northern and western coasts.

(Babington, *Manual*.)

BOBBIN NET AND LACE. [WEAVING, P. C., p. 179.]

BO'BBIO, *the Province of*, an administrative division of the Sardinian territories, situated on the northern side of the Ligurian Apennines, is bounded north by the province of Voghera, west by the provinces of Novi and Tortona, south by the province of Chiavari, and east by the territory of Piacenza in the duchy of Parma. The province is mostly covered by ramifications of the Apennines, the principal one of which runs in a north-east direction, dividing the valley of the river Staffora from that of the Trebbia, both affluents of the Po. The highest summit, Monte Penice, is a calcareous mountain of a pyramidal form, rising north-west of the town of Bobbio, and is crossed by the road leading to Voghera. From the summit of the Penice there is a splendid view of the plains of Lombardy, the hills of Monferrato, and the chain of the Ligurian Apennines.

The province of Bobbio is about 25 miles long, and [illegible] 10 miles wide. It is divided into four mandamenti or districts, Bobbio, Ottone, Varzi, and Zavatarello, containing in all 27 communes, and about 32,000 inhabitants. The valleys produce corn, Indian corn, wine, and fruit. The mountains are partly covered with forests. Farms are mostly small. Sheep and pigs are numerous; the horned cattle is scanty and poor. Until lately there was not a carriage-road in the whole province. Many of the inhabitants emigrate to the plains to earn their subsistence.

Bobbio, the head town, is situated in a valley near the left bank of the Trebbia; it is a bishop's see, and has about [illegible] inhabitants. Besides the cathedral, the church and former convent of St. Columbanus are deserving of notice. The cathedral is a vast and handsome building. The church, which is now a parish church, is large; it has 21 altars, some good fresco paintings, and a subterraneous vault in which St. Columbanus and several of his disciples are buried. Gerbert, afterwards Sylvester II., was for a time an inmate of the convent of Bobbio. The church and convent were first built about the end of the sixth century, but they have been rebuilt or restored at various times. The well-known library, rich in valuable and rare MSS., among which were several palimpsests, has been distributed among the libraries of Milan, of the Vatican, and of the Turin university. The other buildings deserving of notice are—the palace of the antient family of Malaspina, and the episcopal palace. There is another Bobbio in the Sardinian states, in the district of the Valdenses near Pinerol.

(Casalis, *Dizionario Geografico Statistico degli Stati Sardi.*)

BOERNE, LUDWIG, was born in 1784, of Jewish parents, at Frankfort on the Main, where his father, [illegible] Baruch, was a banker. After having received his preparatory education in his native place, he went to the university of Berlin, and afterwards to that of Halle, where he studied medicine, though against his will, for as persons of the Jewish persuasion cannot hold any public office in Germany, the only scientific department that they can devote themselves to with any hope of advantage to themselves is medicine, which they are allowed to practise. In 1807 however he gave up his medical pursuits, and in the university of Heidelberg he began to study politics and political economy, which he continued in 1808 at Giessen. On his return to Frankfort, which was then in the hands of the French, he received an office in the department of the police, which he held for several years, although it little agreed with his peculiar views. In 18[illegible] when Frankfort recovered its old constitution, Boerne, being a Jew, was of course dismissed from his office, but received a pension. Having thus got rid of all external ties, he now began to devote himself with energy and great success to what he conceived to be his calling: he became a political writer, and successively edited three periodicals, the 'Frankfurter Staats-Ristretto,' 'Die Zeitschwingen,' and 'Die Wage,' which were published at Offenbach, and to which he himself contributed some of the best of the political essays and literary criticisms. But as these periodicals, especially the 'Zeitschwingen,' were of too liberal a nature, the government of Hesse-Darmstadt suppressed them, and Boerne himself was soon after arrested at Frankfort, and charged with having promulgated revolutionary ideas. He was tried as a criminal, but as no evidence was brought against him, he was acquitted, and declared perfectly innocent. In 1817 Boerne exchanged his Jewish religion for Protestantism, and altered his name Baruch into Boerne. After having given up 'Die Wage,' in 1821, he lived in complete retirement, partly at Frankfort, partly at Paris, and partly at Hamburg, and about the time of the French revolution of 1830, he went to reside at Paris, where he hoped to find that freedom which he had in vain laboured to rouse in Germany. But his expectations were disappointed, and he now endeavoured to act upon Germany through the medium of a French journal, 'La Balance,' which he established, and which was at the same time to be a sort of mediator between the two countries. But he gradually sank into a state of despondency and bitterness, which greatly contributed to his death, which took place on the 13th of February, 1837.

Owing to his retirement he was nearly forgotten in Germany, when, shortly before the outbreak of the French revolution, he published a collection of all his political, critical, and philosophical writings, in 8 vols. 8vo. (Hamburg, 182[illegible]-31; a second edition appeared in 1835). The occurrences in France contributed to make his works at the time very pular with the liberal party. During his residence at is he published six more volumes of political letters, enti- 'Briefe aus Paris,' and 'Neue Briefe aus Paris,' in h he attacked the German governments most unsparingly, with a bitterness which must be accounted for by the pointment of his hopes. Boerne, with all his faults, is the most eminent political and critical German writers e present century. He was a man of great humour and his deep feeling is most manifest in a splendid eulogium an Paul ('Denkrede auf Jean Paul,' Erlangen and Ham- 1826, 8vo.), and he was one of the few Germans at who maintained his character as a German, and did not into that frivolity and licentiousness into which many able of his acquaintance fell. He remained what he had been, a sincere warm-hearted man. All his writings tinguished for power, clearness, and brilliancy of style, es rarely met with in German writers. Some years his death, his former friend, H. Heine, a witty but frivolous writer, published a work on Boerne, enti- 'Heine über Boerne' (Hamburg, 1840, 8vo.), which is most defamatory nature. A monument infinitely more hy of the noble spirit of Boerne is his Life by Carl Gutz- (*L. Boerne's Leben*, Hamburg, 1840). The Germans ris have erected a brass monument on the tomb of e in the cemetery of Père-la-Chaise, which was executed by the French sculptor David.

OGUE, DAVID, one of the principal founders of the on Missionary Society, was born on the 18th of February Style), 1750, at Dowlau, near Eyemouth, in Berwick-, and was a younger son of John Bogue, a landed propri- He received his early education at the grammar-school Dunse, and afterwards removed to the university of Edin-, where he continued his studies for nine years; and the degree of A.M. in 1771. He was licensed as a er in the Church of Scotland; but, although he had a ct of obtaining the living of Coldingham, his native , his views on the subject of church patronage led him nquish his prospects of promotion, and to come to Lon- where he arrived in 1771. He shortly engaged himself er in a school at Chelsea, kept by the Rev. Mr. Smith, lver-street Chapel, whom he assisted also in his minis- duties; and in 1776 he visited Holland, having been ed to take the pastoral charge of a Scotch church at erdam. From the unsatisfactory appearance of affairs , Bogue declined this engagement, and returned to Eng- l, and in the next year he was chosen pastor of an Inde- ent church at Gosport, where he remained until his , a period of nearly fifty years. About the year 1789, e request of an opulent friend who desired to promote education of young ministers of the Independent denomi-, Bogue began to superintend a kind of dissenting e, many of the students in which attained eminence; hortly afterwards he commenced his efforts on behalf of ian missions, which led to the establishment of the on Missionary Society. In 1792 he published a dis- e on this subject, which had been preached before the ty for promoting Religious Knowledge in the Highlands Islands of Scotland, which, while it tended to excite eal of those favourable to missions, drew upon the author obloquy from those who looked with more jealousy than elf upon the political changes then commencing on the inent of Europe—changes which he, in common with y other friends of civil and religious liberty, contemplated deep interest and lively hope. In consequence of his l opinions, Bogue was not only exposed to much vilifi- while he lived, but has been styled since his death 'a and somewhat revolutionary political dissenter,' a cha- r which is contradicted by the whole tenor of his useful , and from which he is ably defended by Dr. Morison in work referred to at the close of this article. A paper plied by Bogue to the 'Evangelical Magazine' for Sep- er, 1794, was the more immediate precursor of the don Missionary Society, in the formation of which, in the wing year, he took an active part. Shortly afterwards made arrangements for going out with a new mission to gal, the expenses of which were to be borne by his friend ert Haldane; but, after repeated efforts to obtain the essary permission from the East India Company, who re opposed to the design, it was relinquished. He then ertook the charge of a missionary seminary which the ectors of the London Missionary Society deemed it ad- ble to found in aid of their foreign labours. Immediately er the peace of Amiens, in 1802, Bogue, in company with Mr. Hardcastle, Dr. Waugh, and the Rev. Matthew Wilks, visited Paris for the purpose of promoting measures which had long been contemplated for the introduction of Bibles and religious works into France, and in furtherance of which object he had written his 'Essay on the Divine Authority of the New Testament,' a work which, in addition to being very widely circulated in the English and French languages, has been translated into Spanish, Italian, and German. A copy was sent to Bonaparte while at St. Helena by the dowager Lady Grey, and, after his death, was returned to the author with some marginal notes by the emperor. In 1816, in conjunction with Dr. Bennett, Bogue undertook another continental missionary tour, for the promotion of the cause of missions in the Netherlands; and during the remainder of his life he was continually engaged in efforts connected with the work which lay so near his heart. In the autumn of 1825, when upon one of his numerous preaching tours for the Missionary Society, he was taken ill at Brighton, where he died on the 25th of October, in his seventy-sixth year. His remains were removed to Alverstoke, near Gosport, and interred with extraordinary marks of respect.

In 1815 the diploma of Doctor of Divinity was conferred upon Bogue, by Yale College, North America; and it has been stated that the same was offered by the university of Edinburgh, but declined. Owing however to his characteristic humility, he did not always use the title, even in his published works. In addition to his intimate connection with the London Missionary Society, Bogue was one of the originators of the Religious Tract Society, and wrote the first tract issued by it. He was also one of the founders and first editors of the 'Evangelical Magazine,' and was more or less connected with most of the important religious movements of his age. 'He was,' indeed, to use the words of the 'Gentleman's Magazine,' 'one of those men who contribute greatly to influence the character of the public mind.' Besides various minor works, he published discourses on the Millennium, and, in conjunction with his pupil and friend, Dr. James Bennett, a 'History of Dissenters, from the Revolution in 1688 to the year 1808,' in four volumes, 8vo., 1808-1812. A second edition, somewhat condensed and re-arranged, was published in 1833, in two 8vo. volumes, by Dr. Bennett, who has written a continuation of the history as a separate work. Dr. Bennett has published a lengthened memoir of Bogue, and there is a very full account of him, containing some additional matter, in Dr. Morison's 'Fathers and Founders of the London Missionary Society.' A brief French memoir in the 'Archives du Christianisme' for 1826 was reprinted at Paris as an 8vo. pamphlet. Behnes, the sculptor, has executed a bust of Dr. Bogue, from a posthumous cast, which conveys a good idea of that remarkable depth and solidity of character which led the French police, on occasion of his visit to Paris, to describe his countenance as characterized by what they termed 'profondeur.'

BOHLEN, PETER VON, late professor of Oriental literature in the university of Königsberg, was born on the 13th of March, 1796, of poor parents, in the village of Wüppels, near Jever, not far from the mouth of the Weser. He lost his father at the age of nine years, when he and his mother with two young daughters were left without any support, but they were assisted by the villagers. Bohlen received his first education in the village school to which he was admitted gratis. The clergyman of the place took great interest in the industrious boy, and even instructed him with his own children. The knowledge he thus acquired, created in him a love of learning, but as he felt that he ought to earn something to contribute to the support of his poor mother, he undertook all kinds of work, such as ploughing, reaping, hay-making, and the like, for the neighbouring farmers. Sometimes he even joined the smugglers on the coast in order to obtain a livelihood for himself and his mother. At last, when he was twelve years old, and it was thought necessary that he should learn some trade, he was put apprentice with a village tailor, in whose house he was obliged to do the lowest and dirtiest work, and to witness the most frightful scenes between husband and wife; he was ill-used by his master and his quarrelsome wife in a manner which he afterwards related with shuddering, and he used to wonder that under such circumstances he had not become a thorough knave himself. In 1810 he, as an orphan boy, for his mother had died in the mean time, was called upon to appear at Jever to be examined as to his fitness for serving in the army of Napoleon. He was delighted at the prospect of getting away from his master and of seeing something of the world. But he was found to be too short, and was obliged to return to the tailor. Some time afterwards he was called upon again, and was admitted into the army. At the examination the French general Guiton took an interest in him, on account of the cheerfulness with which he appeared to enter upon his new life. The general gave him some money, and permission to go and take leave of his friends. Bohlen, on his return, remained with the general in the capacity of servant; and in 1812 he accompanied his new master, who was extremely kind to him, to Hanover, from which place frequent excursions were made to the neighbouring towns. Afterwards they travelled to Stuttgard, Switzerland, and Berlin. General Guiton gradually ceased to demand any services of Bohlen, and treated him more as a son than as a servant. In 1813, when the French army returned from Russia, Guiton and his corps retreated to Magdeburg. Bohlen afterwards accompanied the general to Hamburg. At this time however the relation between the general and Bohlen became greatly altered; the Frenchman became more harsh and severe, and the young German, forgetting the kindness he had received, lost no opportunity of showing his obstinacy and his aversion to the French. During the siege of Hamburg Bohlen opened and read a note of great importance, which he had to carry to Fromont, the general's adjutant; and had it not been for Fromont's attachment to Bohlen, he would have paid for his curiosity and indiscretion with his life. Fromont at length procured Bohlen another situation as servant to Admiral l'Hermite, but he did not remain with the admiral above two months. Early in 1814 the French quitted Hamburg; and Bohlen, although he had nothing to live upon, refused to accompany the admiral. He remained at Hamburg; and at first lived for some time with a poor ferryman, who wanted Bohlen to engage in his own trade; but a black cook of Admiral l'Hermite, who had likewise remained at Hamburg, prevailed upon him to seek a place as waiter in an hotel. This was soon found; but the incessant work and the want of rest was more than he could bear; he accordingly left his place, and engaged himself as servant to a rich India merchant. As he had not much to do in his new situation, he got his master's clerk to instruct him in letter-writing and the like, and employed his time in reading. In the mean time he acquired a passion for writing poetry. He had the satisfaction of seeing his poems printed; and as some persons went so far as to compare him to Klopstock, his head was almost turned by his success. He had learned to speak French in his intercourse with Frenchmen, and he now learned English in the same way; for in the house of his employer scarcely any other language than English was spoken. He then began translating Burns into German; and, with the assistance of a dictionary and grammar, he even ventured upon translating Virgil. He next made an attempt to get admission into the gymnasium of Hamburg, but was refused, on the ground of being too old. His employer now became bankrupt, and Bohlen was again as poor as before; for he had never claimed his full wages, but only taken as much as he wanted at the time. Another attempt was made to get into the gymnasium; and the support of several benevolent men at length succeeded in gaining for him what he wanted, and in 1817 Bohlen became a pupil of the Johanneum at Hamburg. His diligence was extraordinary, and his conduct secured the good will of all. The gifts of benevolent friends, and private lessons which he began to give, procured him the means of living. His intention was at first to study theology; but the preparation that he made for it, the study of Hebrew, Arabic, and Persian, led him in another direction. About this time he was induced by a fit of vanity to assume the prefix that indicates a nobleman, *von* Bohlen, as he remembered to have heard that his father was descended from a noble family.

In 1821 he went to the University of Halle, some distinguished and wealthy Hamburgers having provided him with the means of pursuing his studies there for three years. Gesenius was his principal teacher; but he also attended many other courses of lectures on Oriental and classical literature. At the suggestion of Gesenius, Bohlen copied, translated, and commented upon, an episode of Ferdusi, which was sent to the Prussian ministry for the purpose of obtaining assistance from the Prussian government to continue his studies, and of paving the way to a future appointment in Prussia. In 1822, before he left Halle, Von Bohlen published a little work, 'Symbolae ad Interpretationem S. Cod. ex Lingua Persica,' which was well received; and in the autumn of the same year he went to Bonn, to study Arabic under Freytag. Here he wrote a dissertation on the life and character of
Motenabbi, which received the prize, and was pr
Bonn in 1824; it was very well received by those a
with the literature of the Arabs. In the mean time
tinued his studies of the Persian language, and in
began that of Sanscrit, under A. W. von Schlegel,
learned Italian and Spanish. Towards the end of
the Prussian ministry summoned him to Berlin, that
complete his studies there, and prepare himself for
sorship at Königsberg, where it was proposed to give
appointment. At Berlin he attended the lectures
and formed an intimate friendship with the late Dr. R
1825 he went to Königsberg to begin his career of a
teacher, in the usual way, as a private lecturer. He
however, from the first, a considerable salary; and in
was appointed professor extraordinary. In 1827 he
to Bonn, and married a lady whose acquaintance he
during his stay there: and the year after he was
ordinary professor of Oriental literature. The
climate of Königsberg began gradually to under
health; and its influence was increased by his incess
and neglect of exercise. He then visited England
purpose of acquiring Oriental MSS. and books, for
Prussian ministry placed funds at his disposal. H
provided by the government with Arabic and D
types, and printed with his own hands the 'Carme
Soon after he published his great work on Indian a
entitled 'Das Alte Indien,' which, with all its d
one of the most valuable books on antient India
attempt has yet been made to supplant it, though
great work on the antiquities of India, which is n
course of publication, will probably supersede the
Bohlen. In 1837 he undertook a second journey to
He stayed some time with the son of the Marquis
downe, and pursued his Oriental studies with his f
Rosen. On his return to the Continent he travelle
wife to the south of France and Italy for the bene
health. Bohlen's health also was in such a precar
that his friends advised him not to return to the n
therefore lingered at Heidelberg and Bonn for some
then went to Halle. His wife died on the 7th
1839, and from this blow he never recovered. He
to return to Königsberg, and remained at Halle. I
ginning of 1840 his condition became worse, and h
the 6th of February at Halle, where he was buried.

Bohlen appears to have been a most amiable man
his autobiography, from which this account is taken,
without any reserve all the vicissitudes of his life, in
which secures the affection and admiration of ever
His character appears to have been very much like t
friend Rosen. In 1826 he was elected a member of
Asiatic Society of London. He possessed a most
knowledge of Eastern history and literature, and
rank among the first of their class: their deficien
mainly from two causes; first, the great haste with
worked, and secondly, a want of sound philologic
ledge, for which he had little taste; though in later
defect greatly impeded his antiquarian researches, a
self confesses. We pass over a great number of p
reviews which Bohlen wrote for the leading journal
many, and shall merely subjoin a list of his separate w
'Symbolae ad Interpretationem Sacr. Cod. ex Lingua
Leipzig, 1822; 2, 'Commentatio de Motenabbio, ce
Arabum Poeta,' Bonn, 1824; 3, 'Carmen Arabicu
dictum,' Königsberg, 1825; 4, 'Vermischte Gedi
Uebersetzungen,' Königsberg, 1826; 5, 'De Bu
Tentamen,' Königsberg, 1827; 6, 'Das alte Indien
sonderer Rücksicht auf Aegypten,' 2 vols., Königsbe
7, 'Bhartriharis Sententiae et Carmen Chauropa
Berlin, 1833; 8, 'Die Genesis, historisch-kritisch
Königsberg, 1835; 9, 'Die Sprüche des Bhartrihari,
nachgebildet,' Hamburg, 1835; 10, 'Ritusanhâra,
pestatum Cyclus, Carmen Kâlidâsi,' Lips. 1840. B
a contributor to the Penny Cyclopædia, for which
the articles LOKMAN, MAHABHARATAM, MA
GHISNI, MANU, MOHAMMED (including KORAN),
AND TARTARS.

(*Autobiographie des Dr. Peter von Bohlen, hera*
von Joh. Voigt, Königsberg, 1842, second edition.)

BOIELDIEU, ADRIEN-FRANÇOIS, a Fre
poser of high and well-deserved reputation, wa
Rouen, in 1775. At a very early period of his life
fested a most decided talent for music, and at eight
a one-act opera, which was produced at the theat

', and drew all the amateurs of Normandy to hear
5 he went to Paris, and brought out several compo-
which many met with great success, and some are
ed. In 1797 he produced 'La Famille Suisse,'
era Comique; and this was speedily followed by
In 1800 he wrote three operas,—'Beniowski,'
de Bagdad,' and 'Ma Tante Aurore,' all of them
in beauties of every musical kind, and become
s. On the establishment of the Conservatoire de
by the National Convention, Boieldieu was ap-
e of the professors. In 1803 he accepted of the
lexander the appointment of Maître-de-Chapelle
rial court of Russia, and composed, for the Hermi-
e, some operas, and various smaller dramatic works.
returned to Paris, and there, among other operas,
Jean de Paris,' 'Le Petit Chaperon Rouge,' and
, or, at least, his most popular work, 'La Dame
He afterwards was called upon to compose music
tism of the Duc de Bordeaux, and the coronation
X. After this, the state of his health indicating
some repose, he proceeded to a watering-place in
es, and appeared to be much benefited by his
nd relief from business and care; but soon after
denly attacked by illness, and died, October 3rd,
a very short confinement.

was honoured by a splendid public funeral,
in some degree, a military one, for he was an
he National Guard, and held the order of the
Honour. Mass was celebrated in the grandest
the Eglise des Invalides, and his remains were
ed in the cemetery of Père-la-Chaise. The heart
lever composer was claimed by the city of Rouen,
d with great pomp in the cathedral, which
ently decorated for the occasion, the council of the
voted 12,000 francs to defray the expense of
y. They also erected a column to the memory of
nished countryman; and the government settled a
he son of the composer, M. Adrien Boieldieu.

is the general name applied to vessels, whether
n, in which fluids are exposed to heat for the pur-
ition or evaporation: but the term is most com-
d to the close vessels used for the generation of
h boilers, to lessen the danger of explosion, are
ably made of wrought metal, which, if burst, will
than fly to pieces, as cast metal would do; and
de for the purpose are formed of the best and
tal, and rolled or wrought with peculiar care.
iffer as to the comparative merits of iron and
material for steam-engine boilers. Most how-
hat iron, when of good quality, has the greatest
ngth, although the greater uniformity of texture
per renders it safe to construct copper boilers of
s than those of iron, to withstand a given pressure.
n this, supposing an explosion to occur with a
r, it is likely only to produce a rent or tear in the
an iron boiler, even though wholly of wrought
quently blown to pieces. The cost of copper is
imes that of iron, but as, owing to its far more
ission of heat, a copper boiler may be made con-
aller than an iron one to produce the same quan-
, and may therefore be still further reduced in
d weight without impairing its strength: the cost
boiler is nearer twice than four times that of an
f equal evaporating power: and, as a set-off to
d expenditure, the value of the old copper, when
worn out, is equal to three-fourths of its original
n old iron boiler is worth little more than the cost
Steam-engine boilers are treated of under Steam-
. C., pp. ~~452-454~~. Steam-Carriage [P. C.,
d Steam-Vessel [P. C., p. [illegible]], and those of
motives under Railway [P. C., pp. 249, 250];
ders as may wish for further information respect-
us schemes which have been devised for remedy-
or supposed defects of ordinary boilers or steam
will find some curious details in the article
Hebert's *Engineer's and Mechanic's Encyclo-*
lers for the production of steam or the heating of
e purpose of warming buildings are noticed under
and Ventilation [P. C., pp. 69, 70].
rious other kinds of boiler employed in manufac-
tions, one of the most important is that employed.
me of Howard's Vacuum-Pan for boiling sugar at
perature than in the open air, by the formation of

a partial vacuum. A representation of this apparatus is given under Sugar [P. C., p. 232].

BOL, FERDINAND, a very able portrait painter and etcher, born at Dort in the early part of the seventeenth century. He was the pupil of Rembrandt, and executed some portraits in his style, of equal merit. He painted also some historical pieces of great merit, which are at Amsterdam, but they are inferior to his portraits. He died rich, at Amsterdam, where he principally lived, in 1681, advanced in years. He etched also sixteen spirited plates.

(Houbracken, *Schouburg der Kunstschilders*, &c.; Bartsch, *Catalogue Raisonné de l'Œuvre de Rembrandt*, &c.; Heineken, *Dictionnaire des Artistes*, &c.)

BOLOGNA, JOHN OF, or GIOVANNI DA, a celebrated sculptor and architect, born at Douay in Flanders, about 1524. He went early to Rome, where he distinguished himself by his models of celebrated works. Though a Fleming, he is known only by the above name. Van Mander calls him Jean de Bologne, yet he lived the greater part of his life at Florence. Van Mander probably knew only that name by which he was called by Vasari, who speaks of him as Giovanni Bologna, or Giovan Bologna da Douai, a name which he seems to have acquired from his celebrated fountain at Bologna, of which the crowning colossal bronze figure of Neptune is one of the masterpieces of modern sculpture.

Several also of the noblest works in sculpture at Florence are by the hand of John of Bologna, two of which are unsurpassed in modern art—the marble group of the Rape of the Sabine Woman, in the Loggia de' Lanzi, in the Piazza Granduca; and the well known bronze of Mercury in the act of springing into the air, with one foot still upon a globe, in the imperial gallery.

John was one of the original forty members of the Academy of Florence, and was also sculptor to the grand-duke Francesco I. In 1580 he was invited to Genoa, where he executed several admirable works, chiefly in bronze. He died at Florence in 1608, aged eighty-four, or, according to a note in De Yongh's edition of Van Mander, only seventy-nine, for it is there stated that he was born in 1529. Baldinucci, the chief authority for the life of John of Bologna, mentions in the body of his article, that he died in August, in 1608, a few months before his bronze equestrian statue of the grand-duke of Florence, Ferdinand I., was fixed in its place; yet in the heading of the article it is said that he died in 1599, an inconsistency probably due to the editor. John of Bologna is the sculptor who, when he showed to Michelangelo, whilst at Rome, a carefully finished model, was told by the latter to learn to sketch before he attempted to finish—a precept which he did not forget. John of Bologna, with the exception of Michelangelo, surpassed all the sculptors of his age, or indeed of the sixteenth century, and he surpassed Michelangelo himself in proportion and execution. His Rape of the Sabine is a magnificent group; it is composed of three figures: the Roman is bearing the woman away in his arms, and is striding over a fallen Sabine. Andreani has cut three excellent views of it in chiaroscuro, in wood; Louis XIV. had it cast in bronze.

(Vasari, *Vite de' Pittori*, &c., ed. of Leghorn; Baldinucci, *Notizie dei Professori del Disegno*, &c.)

BOLSOVER STONE. The yellow limestone of Bolsover in Derbyshire is used in the construction of the new Houses of Parliament. It was selected for its durability, strength, fitness for ornamental work, and colour. It is a combination of carbonate of magnesia with carbonate of lime, in small granular crystals, without the slightest trace of organization, flinty nodules, or other blemishes. It has been subjected to various and severe mechanical pressures, chemical reagents, &c., and has sustained them with credit: but it is yet to be seen whether it can withstand the atmosphere of London, which has destroyed the Bath and Portland oolites.

BOLSWERT, SCHELTIUS, a designer and very celebrated engraver, born at Bolswert in Friesland, in 1586. He lived and worked chiefly at Antwerp, with his elder brother Boetius. His best works are after Rubens and Vandyck, after whom he has engraved several admirable works on a large scale. He was the personal friend of both painters, and Rubens is said to have examined and touched with the crayon all the proofs of Bolswert's engravings after his works. Bolswert's prints are distinguished as true works of art, not as mere excellent mechanical performances of the graver, a kind of excellence to which they make no pretension. They are admirably drawn, various and true in their effects of colour, and effective in light and shade: he preserved also the characteristic style of the master after whom he engraved. He tion, Joseph embarked for the United States, after having a last interview with his brother at the Ile d'Aix. He was well received in the United States, and after a time he fixed his residence on the banks of the Delaware, near Philadelphia, where he purchased an estate. He assumed the title of Count de Survilliers, and lived in a style of affluence, affording employment to many of the labouring population, and hospitality to the French emigrants who resorted to America. His wife remained in Europe with her two daughters, and resided at Brussels and afterwards at Florence. When the Paris revolution of 1830 became known in America, Joseph wrote a long letter or address to the House of Deputies, in which he put forth the claims of his nephew the young Napoleon. The letter was not read to the Chamber. He came himself to England soon after, and resided some time in this country, and at last repaired to Italy, where he died at Florence, in July, 1844. He was buried in the vaults of the church of Santa Croce. He is said in the newspapers to have left a fortune of fifteen millions of francs.

(*Biographical Sketch of Joseph Napoleon Bonaparte*, London, 1833; Abel Hugo, *Précis Historique des Evènemens qui ont conduit Joseph Napoleon sur le Trône d'Espagne;* Botta, *Storia d'Italia;* Coppi, *Annali d'Italia;* Colletta, *Storia del Reame di Napoli;* Thibaudeau, *Le Consulat et l'Empire.*)

BONAPARTE, LUCIE'N, a younger brother of Napoleon, was born at Ajaccio in 1775. He emigrated to Marseille with the rest of the family in 1793. He entered warmly into the revolutionary notions of that period, and made flaming speeches at various clubs, and wrote turgid pamphlets on liberty and equality. Soon after, he obtained employment in the commissariat at St. Maximin, a small town of Provence, where he married the daughter of an innkeeper. Being one of the republican municipality of that place, he exerted himself laudably, and at his own imminent peril, to save several unfortunate individuals accused of royalism, whom an agent of Barras and Freron, the terrorist commissioners in the south of France, wanted to remove to the prisons of Orange, where the guillotine was in constant activity. By showing a bold front to the agent, whom Lucien charged with informality in his commission, he detained the intended victims under arrest at St. Maximin, until the fall of Robespierre put a stop to the reign of terror. In the reaction however which took place in the south of France against the so-called Jacobins, Lucien was arrested as such on account of his speeches, and one of those whom he had saved proved most hostile against him. He was however liberated after a time. In 1796 Lucien was appointed commissary at war, probably through the influence of his brother, General Bonaparte. In the following year he was elected deputy to the Council of the Five Hundred, and he went to reside at Paris, where he took a house, of which his sister, Elisa Baciocchi, did the honours. His drawing-room was resorted to by several men of note and of literary acquirements. Lucien took the opposition side in the council, and allied himself to Sièyes and his party, who wished to try their hands at a new constitution. While Napoleon was in Egypt, Lucien wrote to him, complaining of the incapacity and misgovernment of the Executive Directory, and urging him to return to France, which letters are said to have been intercepted by the English cruisers. After Napoleon's return, in October, 1799, Lucien, who was the president of the council, became the active leader of those who wished to overturn the Directory. In the stormy sitting of the 19th Brumaire, he resisted the motion made by several members to outlaw General Bonaparte, and as the confusion and uproar increased in the hall, he left the chair, and addressing his brother's soldiers outside, told them to march in and drive away the factious men who were sold to the English, the usual phrase in those times, and who were no longer the representatives of France. After the accomplishment of that revolution, in which he rendered most material assistance to his brother, he was one of the members of the commission which framed the new or Consular constitution. Soon after he was appointed minister of the interior, but remained in office only a short time, having had some disagreement with his brother upon matters of administration; and in October, 1800, after the campaign of Marengo, Napoleon sent him ambassador to Spain. His mission proved successful: he managed to ingratiate himself with Charles IV. and the favourite Godoy, and to re-establish French influence in Spain. He induced the weak Spanish government to join France in an attack upon Portugal, which ended by the latter country being obliged to sue for peace, for
which it paid dearly. He also completed th
concerning the new kingdom of Etruria, to b
young infante, son of the Duke of Parma, who
Spanish princess, in exchange for which S
France her rights upon Parma and Piacenza.
Louisiana to France was likewise confirmed.
cluded these negotiations, Lucien returned to
He was made a member of the tribunate, and
ported with all his eloquence the concordat
and also the institution of the Legion of Ho
was made a senator, and his brother gave him t
or living of Sopelsdorf, an estate of the for
Treves. His wife being dead, Lucien married,
Jouberthou, the widow of a stockbroker, who
Domingo. Napoleon disapproved of this marri
disapproved of the marriage of Jerome, bec
forward to royal alliances for his brothers.
ever supported the project of making his brot
life; but he says in his memoirs that he w
stopped there, and that he opposed from the
establishing an hereditary dynasty. When he
determined on assuming the imperial crown,
in the spring of 1804, and went to Italy. T
others say that the two brothers quarrelled on
about Lucien's marriage in particular. Lucien
of having, by his insidious reports, contribu
him from his brother. The Senatus Consultu
the hereditary succession in Napoleon's fami
brothers Joseph and Louis as eventual heirs
but made no mention of either Lucien or Jer
after a time, fixed his residence at Rome, wher
kindly received by Pope Pius VII. He took
and lived in a style of affluence. Being fond o
the fine arts, his house was much frequente
peace of Tilsit, Napoleon repaired to North
of 1807, and sent for his brother Lucien to
Mantua. The two brothers had there a confe
it seems that Napoleon offered to give Lucie
Italy, at the same time telling him plainly th
he must be prepared to obey all his orders
internal as well as the external policy of his
Lucien declined accepting a crown on those
that he preferred to remain in a private statio
Napoleon replied; 'you cannot have hencefor
of complaint against me.' But he added in
Lucien would not fall in with his system of p
prepare to quit the Continent, where his s
could no longer be tolerated. (*Réponse de Lu*
aux Mémoires du Général Lamarque.)

Lucien returned to Rome, where he purch
of Canino, in the province of Viterbo, near
Tuscany. Pope Pius VII. created him Prince
Musignano in 1808. Soon after Napoleon beg
vexatious proceedings towards the court of Rom
in the arrest of the pope, and the seizure of
When the French took possession of Rome in
who had expressed himself very freely against
brother's policy, was advised to leave that city,
to his country estate. In 1810 he resolved
United States, and having obtained passports fr
some say without any passports, he sailed from
but was seized by an English cruiser and car
where after a time he obtained permission fro
government to reside in England under surveill
castle was fixed upon as his residence. Some
removed to a place in the neighbourhood, whe
till the end of the war, and employed himself
poem of Charlemagne. After the peace of 18
to Rome, where he dedicated to Pope Pius his p
magne. When Napoleon returned to France
1815, Lucien repaired to Paris. His object i
appear very clear. It has been surmised by so
acted from a generous impulse, to tender to
advice in the hour of danger, and to keep him a
within constitutional limits. However this may
live at the palace of the Orleans family, assum
an imperial prince, and claimed a seat of honour
new House of Peers. This was resisted by se
the ground that he had never been acknowled
of the empire, and had no diploma as such,
his seat in the body of the house as a common
private councils that took place, he advise
offer to the Emperor of Austria, in order to de

bdicate in favour of his son. This manœuvre cceeded, Napoleon set off for the army, lost the terloo, and returned to Paris without an army. appointed extraordinary commissioner of the communicate with the representatives of the to revive in the Chamber of Deputies a feeling r his brother; he spoke eloquently, he appealed de of the nation, but was answered sternly by The nation has followed your brother over fifty , from the burning sands of Egypt to the frozen ssia, through disasters as well as triumphs, and that we mourn the loss of three millions of Lucien advised his brother to dissolve the ce he could not manage them, and to assume p. Napoleon hesitated, and at last refused; he uld not kindle a civil war; he most likely per- cien did not see, that the attempt would only protracted struggle, attended by additional cala- nce and to himself. Lucien says that he was apoleon's abdication, but when he saw his nined upon it, he insisted upon its being made ur of young Napoleon. Napoleon smiled and d incredulously, but at length inserted the r of his son. Lucien then proceeded to address Peers to induce them to proclaim at once Na- t in vain he cried out, according to the forms of rchy, 'The emperor has abdicated, long live the House remained mute, and as he went on nently, one of the peers, Pontécoulant, taunted g an alien, a foreign titulary, a Roman prince, citizen of France. Soon after the allied armies arance, Napoleon went to Rochefort, and Lucien rn to Italy. He rejoined his family at Rome, wards spent many years in peaceful retirement. gan digging at a place called La Cucumella on nino, which is believed to have been the site of ulonia, once an important Etruscan city, and he ple collection of Etruscan antiquities, of which description: 'Museum Etrusque de Lucien nce de Canino.' During the insurrection in s, in 1831, Lucien kept himself and his family t disorderly attempt. Some time after he re- d, where he published several of his works. He ly, where he died in 1840. His eldest son, Bonaparte, well known as a naturalist, and Ornithology of the United States,' and of the lla Fauna Italica,' succeeded to the title. the cause of science, he has been the chief e annual congresses of the scientific men of cien's other children, one, having had some s with the Papal authorities, was obliged to Lucien ranks as a French author in prose and published works are:—1, 'Charlemagne, ou e,' an epic poem in 24 cantos, which has been English by S. Butler, D.D., and the Rev. F. ls. 4to., London, 1315. 2, 'La Cyrnéide, ou e,' a poem in 12 cantos. 3, 'Mémoires de rte, Prince de Canino, écrits par luimême,' 8vo. 4, 'Réponse de Lucien Bonaparte aux Mé- ral Lamarque,' London, 1835. This is a sort of ion, and at the same time an apology for his own 's political conduct during the hundred days; e curious revelations and frank avowals, though oherent in its reasoning, like all the attempted Napoleon's political morality. Several of Lu- s while a tribune have also been published; is 'Rapport sur l'Organisation des Cultes,' and la Légion d'Honneur.' A defamatory book, en- ires de Lucien Bonaparte,' was published in the Restoration, but is now understood to be r.

u, *Le Consulat et l'Empire; Biographie des Con-* nd the works of Lucien already quoted.)

RTE, HORTENSE EUGÉNIE BEAU- daughter of Alexandre Viscount de Beauhar- osephine Tascher de la Pagerie, was born at . She was a child when the Revolution broke her father lost his life, and her mother was im- was only saved by the timely death of Robes- r the end of the reign of terror, Hortense to Madame Campan for her education. Her d marriage with General Bonaparte bright- pects; and when her stepfather became First Consul, Hortense went to enliven by her youthful grace and sprightly humour the court circle of the Tuileries. Napoleon was much pleased with her, as well as with her brother Eugene, and he behaved as a real father to both. In 1802 he gave Hortense in marriage to his younger brother Louis. It seems that his other brothers were not favourable to this match. Hortense had a son who died some years after in Holland. Her second son was christened by Pope Pius VII. at the time of Napoleon's coronation in 1804. Hortense's sons were looked upon as the eventual heirs of Napoleon, as he had no children, and his brother Joseph had only daughters. In 1806, Stephanie de Beauharnois, Hortense's cousin, was married to the hereditary prince of Baden. In the same year Louis was appointed King of Holland, and his wife followed him thither, not without regretting Paris and its brilliant society. In Holland Louis was inclined to favour his new subjects, the Dutch and their interests, but his wife was all for France and for Napoleon, who expected that his brothers should act merely as his lieutenants in the countries over which he appointed them to rule. After the death of her eldest son in 1807, Hortense was advised to travel for her health, and she ultimately returned to Paris, where she was delivered of a third son. In 1809, when Louis and Napoleon were at variance about Dutch politics, Hortense repaired to Holland at Napoleon's request, to watch her husband and keep him within the bounds of his allegiance to his imperial brother. Louis however proved refractory, and at last quitted Holland, of which Napoleon took possession. He repaired to Austria, and his wife returned to Paris, where she had an hotel and a princely household, and went by the name of the Queen of Holland, though her husband was no longer king. The eldest of her two living sons bore the title of Grand Duke of Berg. The divorce of her mother blighted the prospects of Hortense and her children, but she bore this disappointment with equanimity, always professing the most unbounded devotion to Napoleon, and obedience to his will. She became separated though not divorced from her husband, whose temper and tastes did not agree with her own. In 1814 she remained at Paris and was zealous in urging the defence of the town against the allies. When Napoleon abdicated at Fontainebleau, she remained with her mother at Malmaison, and saw her breathe her last, a loss which she poignantly felt. The Emperor Alexander showed her a marked interest, and it was chiefly owing to his influence that she obtained a formal grant of the domains of St. Leu, with the title of duchess. As Louis XVIII. had signed the grant, she went to thank him, and by her sprightly conversation delighted the aged king. But her saloon was the resort of most of the disaffected generals and partisans of the Empire; and this gave rise to the report that she was privy to the intrigues which prepared the return from Elba, which however has been denied by her friends. Meantime her husband sued in the French Courts to have his two sons removed from her charge and restored to him, but the return of Napoleon put a stop to the proceedings. She now resumed her attendance at the Tuileries, and did the honours of Napoleon's court. But she used her interest, as she had done before, in favour of the fallen and the unfortunate, without distinction of parties, for she was kind-hearted like her mother. After the battle of Waterloo, she attended Napoleon in his retirement at Malmaison, until he left it to embark. She then set out for Switzerland, and after many vexations from the police of various countries on account of political suspicions concerning her movements, she retired to the town of Constance, and afterwards, in 1817, she purchased the estate of Arenenberg, in the canton of Thurgau, where she afterwards used to spend the summers, and to go and pass the winters at Rome, at the Villa Borghese, which belonged to her sister-in-law Pauline. Her eldest son, Napoleon, married his cousin, Joseph Bonaparte's second daughter. In 1831 both her sons, much to her annoyance, joined the insurrection in the Papal State. The eldest fell ill during that short campaign, and died at Pesaro, and the other was smuggled out of Italy by the anxious mother, and after some narrow escapes they returned together to Arenenberg. This remaining son, Charles Louis, was naturalized as a citizen of the canton of Thurgau. In 1836, having made a rash attempt to put himself at the head of a military insurrection at Strassburg, he was arrested, but Louis-Philippe interfered to save him from punishment on condition of his emigrating to America. Hortense was too ill to follow him, and she died at Arenenberg, in October, 1837. Her son had returned from America to attend her last moments. Her remains were taken to France, and buried in the church of Ruel near Paris, by the side of those of her mother Josephine. Her son being afterwards expelled from Switzerland, in consequence of the remonstrances of the French government, came to England, from whence he made another insurrectionary attempt at Boulogne in 1839, for which he was shut up in the castle of Ham, where he still remains. Hortense had been deprived of the duchy of St. Leu at the second restoration of the Bourbons. She published some reminiscences or fragments of her memoirs, relative especially to her adventures in 1831: 'La Reine Hortense en Italie, en France, et en Angleterre, pendant l'année 1831,' 8vo. Paris, 1834. Amiable, kind-hearted, and womanly in her feelings and tastes, she is out of her sphere when talking of grave political interests; her admiration of Napoleon and his reign was a matter of impulse rather than of reason. Hortense was fond of music, and she composed several airs which have been applauded, among others a favourite one, 'Partant pour la Syrie—le jeune et beau Dunois.'

(*La Reine Hortense en Italie* already quoted; *Supplement* to the *Biographie Universelle*, art. 'Hortense;' Thibaudeau, *Le Consulat et l'Empire*; *Romances mises en musique par Hortense Duchesse de St. Leu*, with a biographical notice, by Count Lagarde.) She has disclaimed, as entirely apocryphal, certain pretended memoirs of her life, published under the name of a Baron van Scheelten.

BONE, HENRY, R. A., the most distinguished enamel-painter of his time, carried this branch of painting to a degree of perfection and efficiency which had previously not even been approached. He was the son of a cabinet chair-maker at Truro, in Cornwall, where he was born in 1755. He showed at an early age some artistic ability, and was accordingly apprenticed to a china manufacturer of the name of Cockworthy, who, in 1778, at the expiration of Bone's term of apprenticeship, was settled in Bristol. He remained in the employ of Mr. Cockworthy another year, at the expiration of which the china business failed, and Bone ventured to try his fortune in London. For many years he was chiefly employed in London by jewellers and others in enamel-painting for watch-cases, brooches, lockets, and the like; and also in a species of art called device-painting. He had however attracted some notice by an enamel portrait of his wife, which he exhibited at the Royal Academy in 1780, and by an original picture of a Muse and Cupid, which, though only five inches and a quarter by four inches and a quarter, was at that time considered to be of extraordinary dimensions: it was engraved in 1790 by R. Dagley.

Towards the close of the last century his engagements increased to that extent, that he was enabled to decline the drudgery of his profession, and to confine himself to miniature and to enamel painting, and he executed on enamel many of his own miniatures. In 1800 his reputation was established by the appointment of enamel-painter to the Prince of Wales, a distinction which was succeeded in the following year by his election as an Associate of the Royal Academy; and he was successively appointed enamel-painter to George III., George IV., and William IV. He was elected a full Academician in 1811, and for twenty years from this time he was assiduously employed in producing a long succession of admirable works, most of them of unprecedented dimensions; but about 1831 his advanced years compelled him to cease his professional labours, and he left his house in Berners Street, where he had chiefly resided, and retired to Clarendon Square, Somers Town, where he died, in December, 1834. Though Bone was in full employment for many years, his family was too numerous to allow him to grow rich. He had a son in the army and another in the navy, both of whom he survived: the former, Lieutenant Bone, died in consequence of wounds received at the battle of Toulouse. H. P. Bone, the present enamel-painter to the queen, is also one of his sons. Mrs. Bone, whom he married in 1779, was a Miss Vandermeulen, and was directly descended from Peter, the brother of the celebrated battle-painter Charles Antony Vandermeulen, and himself battle-painter to William III.

The following are Bone's principal works:—The Death of Dido; Cymon and Iphigenia; Venus; and Hope nursing Love, after Sir Joshua Reynolds; a copy (in the article ENAMEL, P. C., erroneously ascribed to his son, H. P. Bone) of a picture of Bacchus and Ariadne, by Titian, eighteen inches by sixteen and a half, dimensions up to this time unapproached except by himself, which was purchased by George Bowles, Esq., of Cavendish Square, for 2200 guineas. The original picture, which is now in the National Gallery, was
then the property of the late Lord Kinnaird,
Bone for the express purpose of copying it.
cumbent, after Titian; Bathsheba, after N.
Belle Vierge, after Raphael; and an Assun
Virgin, after Murillo. A series of portraits
family, from the reign of Henry VII. to the
executed for the late Duke of Bedford, and no
Abbey. A set of portraits of the principal R
guished during the civil war of Charles I.,
Esq., of Edge Hill, near Derby, which Bone l
at his death: its completion was undertaken by
Bone, who, in all the great works, was his
ant. And, finally, his greatest and most inte
a series of eighty-five portraits of distinguished
reign of Queen Elizabeth, varying in size from
four to thirteen inches by eight: it remained in
of the artist during his life, but it was his desire
decease it should be offered to the government
which was accordingly done; but although at
price of 5000*l.*, the British government declined
The sum was considered too much for a co
prising eighty-five authentic portraits of the most
characters of one of the most interesting perio
history. The fact of their being copies does not
less interesting or less instructive to the public.
disposed of by public sale, and the greater part
purchased, either at the sale or since, by W
Esq.

(*Annual Biography and Obituary*, 1836.)

BONINGTON, RICHARD PARKES, w
village of Arnold, near Nottingham, in 1801.
father was a landscape and portrait painter, and
strong tendency in his son towards his own pur
very early age, he trained him from his childh
manner as in his judgment was best calculated
his future profession, at the same time not negle
cation, as frequently happens, in those branches
requisite to fit him for the ordinary business of l
ton's professional education however was chi
his father took him to Paris, where he after
resided, when he was only fifteen years old,
him permission to study in the Louvre, where he
excellent copies of some of the best Italian and
scapes in the collection. He became also a s
Institute, attended occasionally the studio of Le
and spent the greater part of his time in the soci
artists.

Having obtained a considerable reputation in
works, which were chiefly marine and coast view
Italy, where Venice, 'throned on her hundred
to Bonington particular attractions in her crum
and her many waters. He made oil pictures
palace and of the grand canal, which were exh
gland, and attracted much notice. They are
what in the style of Canaletto's works. It was
to paint many other similar pictures, of w
already prepared the sketches, but he was alrea
of a fatal disease; he was in a deep decline, an
debility inherent in this complaint reduced him
state, that his constitution sunk under the exci
very success when he returned to England.
London, shortly after his return from a second
in September 1828, having not quite finished
seventh year.

He painted chiefly in water-colours, and mo
river views; his style is simple and picturesq
from conventionalisms.

Sir Thomas Lawrence, who attended Boning
speaks of him in the following terms, in a lette
shortly after his death—'Your sad presage
fatally verified; the last duties have just been
lamented Mr. Bonington. Except in the case of
I have never known, in my own time, the c
talent so promising, and so rapidly and obvious
If I may judge from the later direction of his
from remembrance of a morning's conversati
seemed expanding in every way, and ripening
turity of taste and elevated judgment, with t
ambition which makes confinement to lesser d
the art painfully irksome and annoying:—

> 'But the fair guerdon when we hope to find,
> Comes the blind Fury with the abhorred sh
> And slits the thin-spun life.'

ies of twenty-four engravings from the works of
on has been published by Mr. Carpenter.
ingham, *Lives of British Painters*, &c.)

OMI, JOSEPH, an Italian architect who practised
and, was born at Rome in 1739, and studied archi-
nder the Marchese Teodoli. In 1767 he was invited
and by the brothers Adam, and was for many years
d by them as an assistant and architectural draftsman.
uaintance which he formed in London with Angelica
n, then in the zenith of her fame, led to his marrying
in and ward, Rosa Florini, in 1775. When Angelica
d to Italy, after her marriage with Zucchi the painter,
uced Bonomi to do the same, and he left England in
aking with him his family of three young children;
did not remain in Italy above a year. About five years
is return, in November, 1789, he was elected an Asso-
of the Royal Academy, but was never raised to the rank
A., although Reynolds interested himself very warmly
half, and did all that he could to obtain for him the
orship, which was bestowed on Fuseli. Bonomi died
9, 1808, leaving a widow and six children, the
of whom now practises as an architect at Durham; and
son, who has visited Egypt, has published a work on
yptian antiquities in the British Museum.

i's chief professional works are, additions and alter-
Langley Hall, Kent, 1790; the chapel of the Spanish
y, near Manchester Square, London, 1792; Eastwell
Kent, for G. F. Hatton, Esq., father of the present
Winchester, 1793; the pyramidal mausoleum in Blick-
rk, Norfolk, 1794; Longford Hall, Salop; mansion at
ck, Hants, for H. Portal, Esq., 1797; the splendid
at Roseneath, in Dumbartonshire, for the Duke of
, 1803, which last (not yet completed) is his most cele-
work, and is given as an example of modern design in
ise on Civil Architecture (by Telford) in Brewster's
pedia, although chiefly remarkable for the heresy, if
solecism, of an entrance portico with a column in the
The reason assigned for this caprice is, that as the
was intended for carriages to drive through, it was
a column in the centre of the front would express its
better; yet, besides having a most awkward effect in
column in that situation is not a little objectionable, on
of its obstructing the view from the entrance door.
the design is praised as 'displaying originality of

also made designs for the new sacristy of St.
at Rome, of which edifice he had been appointed
architect in 1804.

**NSIGNO'RE, or BUONSIGNO'RE, FER-
NDO**, architect to the King of Sardinia, and professor
itecture at Turin, is entitled to honourable distinction
profession. Although known to us only by one work,
t alone sufficiently proclaims his talent and establishes
. We regret that, owing perhaps to his recent
(March, 1844), we have not been able to collect
ulars respecting him or his professional life;
Nagler even so much as give him a place in his
ler-Lexicon.' The church 'Della Gran Madre di
' at Turin, an *ex-voto* structure intended to com-
ate the king's return to his dominions, is one of the
ssical and tasteful specimens of recent Italian archi-
a happy application of the idea of the Pantheon
on a moderate scale, but by no means a servile
of it—certainly is distinguished from it by being
a spreading-out basement about 16 feet high
in diameter, which, following the plan of the
and advanced portico, constitutes a parapeted ter-
12 feet wide around the edifice. The ascent is
cessive flights of steps leading up to the portico,
the same width. The portico itself is a Corinthian
, diprostyle, with two inner columns. The in-
30 feet in diameter by 75 in height, to the eye of
la, is divided on its plan into eight compartments
losed and open, the latter forming four semicir-
es or tribunes, with two Corinthian columns in
corresponding with these recessed divisions are
pannels with bas-reliefs in the attic above the order.
is richly coffered with octagonal caissons. Plans,
highly interesting structure may be found in the
of Forster's 'Bauzeitung' for 1837.

OKBINDING. When books were merely groups of
either of thin skin or of some kind of vegetable mem-
the art of the bookbinder was a very primitive one.
He had simply to paste or glue the leaves together, so as to form an extended sheet, and to attach this sheet to a cylinder round which it might be rolled. Even to the present day it is customary in some Oriental countries to write on slips of vellum, to sew these slips together into one long sheet or page, and to attach this to rollers at each end, clasped with gold or silver. The square form of binding, now so well known, was of later date, and constituted a vast stride towards improvement; it was adopted largely for the written missals used in Catholic countries, long before the invention of printing, and has been retained as the most convenient mode of binding.

In the binding of a book at the present day, whether humble or costly, there are generally three classes or successive stages of operations, varying in detail according to circumstances, but following each other pretty much in regular order. These relate first to the grouping of the sheets together, in a uniform and symmetrical way; next to the fixing of the stiff covers or boards which give firmness to the book; and lastly to those processes which relate rather to the external beauty than to the strength or efficiency of the book. These we shall designate as—1. *Preparing*; 2. *Binding*; 3. *Finishing*; and shall notice the different kinds as we go on.

1. *Preparing.* A book is built up of several sheets, each one folded and re-folded so as to assume a more convenient size than as originally printed. The number of successive foldings depends on the size of the work; thus octavo or 8vo. implies that there are eight printed pages on one side of a sheet, and that the sheet must be so folded as to be brought to one-eighth of its original size. The number whereby the size of a book is designated expresses at the same time the number of printed pages obtained from one side of a printed sheet, such as folio, 4to., 8vo., 12mo., 16mo., 18mo., 24mo., 32mo., &c. Some of the sheets employed are larger than others: thus 'royal octavo,' though folded into the same number of pages as 'post octavo,' is larger in size, through the sheet of paper being larger.

The folding of the printed sheets is one of the first operations in preparing for the binder. Each sheet has a letter at the bottom, such as A, B, &c., for identification; and there are as many signatures as there are sheets to form the volume. When the alphabet is in this way exhausted, another in smaller type, or duplicate letters, or letters combined with numerals, are employed. There is a heap of signature A, another heap of signature B, and so on. The folder sits before a bench, on which each sheet is spread out in succession; and the folding is aided by the use of a bone or ivory folding-knife: it is done with great rapidity, and with an accuracy which can only result from constant practice. The folded sheets are 'gathered' into new groups, fitted to make up into books; that is, each new group is made to contain one copy of the sheet bearing signature A, another of signature B, and so on. The groups are next 'collated,' that is, examined throughout to see that no mistake in the order of arrangement occurs.

If the sheets thus folded, gathered, and collated, are to be put into 'boards,' they are sewn in the next process; but if they are to be bound, and therefore finished in a more careful manner, they are beaten or pressed before being sewn, as a means of bringing them to a more compact and smooth state. Until recent periods this process used to be effected by means of the hammer; the volume being divided into parcels of a few sheets; and these parcels, held flat on a smooth stone, being beaten with a heavy hammer. But the 'rolling-press' has greatly improved the mode of proceeding. This press consists of two smooth steel rollers, rotating nearly in contact; the parcels of a volume are placed between tin plates and then passed between the rollers, which gives them a more effective and expeditious pressure than the hammer. Sometimes the ink becomes 'transferred' to the opposite page by this process, when not properly conducted, to the great disfigurement of the book.

In sewing together the sheets for a volume, they are not actually fastened one to another, but all are in common attached to a range of parallel strings or bands placed across the back of the volume. Sometimes marks are cut with a saw across the back edges of the sheets, to receive the strings; but in others cases this is dispensed with. The process of sewing is carried on by the aid of a sewing-press, which consists of a flat bed or board, two upright bars rising from the ends of this, and a cross-bar at the top. The strings are fastened to this cross-bar and are stretched vertically downwards to the bed of the press, where they are firmly secured. The number of these strings depends principally on the size of the book, and varies from two to eight or ten. The sewer (a female) sits in front of the press, lays a folded sheet down on it, with the back edge in contact with the strings, opens the sheet in the middle, and sews it to the strings, passing a needle and thread to and fro. The needle passes through the back edge of the sheet twice as many times as there are strings; the object being to twist the thread round every string, and thus connect them and the sheet together. This being done with respect to the first sheet, a second is laid on the first, and sewn in a similar manner; and so on with a third, a fourth, and as many as there are to form the volume—all the threads being fastened to all the strings, and, indirectly, to each other; for the the thread passes from one sheet to another by a peculiar kind of stitch called a 'ketch' stitch.

Binding.—The sheets are by the sewing-process brought together into a book-like form, and are then ready to pass through the operations connected with the boards and covers. The back-edges of the sheets are glued together, to increase the strength of the volume: this is done simply by holding the book in the left hand, and brushing on it a little warm melted glue. This being dried, the ends of the strings (which are allowed to hang loose for an inch or so beyond the volume) are scraped thin, for the sake either of being rendered invisible when the book comes to be bound, or else to aid in fastening on the boards. The volume is next rounded in a singular manner; that is, rendered convex on the back and concave or hollow on the fore-edge. The workman lays the volume down flat, and hammers it with his right hand, while the left draws the sheets in such a way as to produce the rounding of the edges: the manipulation is a curious one; and as the glue is not yet quite dry, the sheets are enabled to yield a little to the action of the hand and hammer.

A groove is now made to receive the boards or stiff covers. These boards would project beyond the width of the back edge, and would be both unsightly and inconvenient, if some means were not adopted for compressing or confining them. A thin bevel-edged board is placed on each side of the volume far enough from the back edge to allow of a kind of ledge to be formed; these 'backing-boards,' as they are called, are placed parallel with the back edge; and the volume, with these boards on either side, is lowered into a press, with the back edge uppermost. By hammering this edge in a particular way, it is made to expand or spread out, and thus to form two ledges against which the covers of the book are to be placed. Although in common language we call the covers of a book the stiff sides which keep it firm and compact, yet the terms applied by a bookbinder are rather different. With him, this stiff envelope is called the *board*, the leather or cloth applied outside the board is the *cover*, and the two together form the *case*; and it will be convenient to retain the same terms here.

If the book is to be *boarded*, to use a familiar term, the edges of the leaves are not often cut; but if it is to be bound, this cutting of the edges is an essential process, and is done before the boards are fitted to the volume. The cutting is thus effected. The volume, placed between two boards, is screwed in a press; one of the ends of the volume being left projecting a little above the press. A cutting instrument, called a 'plough,' partaking in some degree of the action of a carpenter's plane, is passed over the end of the volume so as to shave off the ragged edges of the sheets, and leave them perfectly smooth. The volume is reversed in position, and the same thing done with the other end. It is then taken out of the press, and struck forcibly against a bench, so as to bring the convexity of the back and the concavity of the front edge alike to a plane level, which admits of the front edges of the leaves being cut in the same manner as the top and bottom edges had been. The book springs back again immediately on being released from the press; and then presents the neat appearance which a concave front edge, convex back, and plane top and bottom edges, are calculated to give.

Matters are now ready for applying the stiff 'boards.' These are made of 'millboard,' a smooth brown or drab-coloured pasteboard made of several layers of paper glued together and strongly pressed. The sizes and thicknesses vary according to the size of the volume and the kind of binding for which they are to be used. The boards are cut very quickly from the large sheets by a cutting edge applied nearly in the same way as in tobacco-shredding or in chaff-cutting. In attaching these boards to the book, the strength of the fastening depends on the kind of binding. If the book is to be 'bound,' holes are made through the boards, opposite strings, and the loose ends of the strings, being passed th these holes, are glued down firmly to the inner surface boards, thereby forming a very firm fastening. If, other hand, the volume is to be in 'cloth boards,' the are not generally passed through and glued down in th but the boards are fastened to the book chiefly by being to the blank leaves or 'end-papers' placed at the beg and end of the book. These boards, in this latter ca brought somewhat to a finished state before being attac the volume; for the cloth is cut to the required handed over to a workman who pastes it upon the two placed sufficiently wide apart to allow for the thickness book. Some books, especially in the present day, 'hollow' in the back; which is thus produced:—A layer of paper or of cloth is placed between the leather cover and the back of the sheets; the leather is glued outer layer, and the back edge of the sheets to the and as the two layers are connected at their edges, tached or loose from each other at their surfaces, they kind of hollowness to the back of the book.

Most well-bound books have a little appendage at th of the back-edge, called the 'head-band.' This finish to the book, and at the same time strengthens covering of the back-edge at that part. For com the head-band consists of a cord inserted in silk or for better work it consists of a little strip of vellum board, around which coloured silken threads are the same process which fastens it to the volume.

When the volume is done in 'cloth,' of one uniform the cloth cover is applied to the boards before the attached to the volume; but when it is 'whole bound,' leather all over the outer surface, or 'half-bound,' having leather and partly paper at the surface, these cov put on after the boards are attached to the book. The is cut to a size rather larger than is required to paring and turning in, and is laid face downwards on a board. The back of the leather is well pasted, and the placed down upon it, the hands of the workman drawing adjusting, and pressing the leather, until it adheres the book in every part. If 'half-binding' be the work, then the leather is so cut as to cover the back small portion of each board or side; while four small applied to the corners. The paper is subsequently on as to hide the ragged edges of all these five pieces of

Finishing.—By the processes above described, the has received all which is really necessary for sheets have been arranged in proper order, sewed to fastened to boards, and covered with cloth, leather, or But a large portion of the talent, the ingenuity, and the applied to this branch of manufacture depend on the quent processes to which the book is subjected. These be rapidly glanced at.

First, with respect to the *edges*. Most persons who chase books are aware that, if in 'boards' or 'cloth the top edges of the sheets, although placed level, are while the fore and bottom edges are ragged, une uncut. In some cases, to make a nearer approach neatness, the fore-edge only is cut; in occasional too, the whole of the edges are cut, but left white. white edge to a book would soon become discol unsightly; and it is far more usual either to sprinkle with colour or to gild it. In sprinkling, the edges of books are laid even one with another, and a piece of dipped into liquid colour, is passed lightly over the as to impart the tint to them regularly· this is called A more general method is that of *sprinkling*. The in this case ranged side by side on a bench, and a brush in the liquid colour (which is formed of some such as Venetian red, umber, &c.) is held over the book lightly tapped against a stick, whereby a shower of on the edges of the books, producing an appearance dep on the colour employed, and the manner in which the of spots is brought about. *Marbled* edges are som produced, by a peculiar admixture and management ferent colours sprinkled on the edge of the book.

Gilt edges are more delicate in their preparation. gold so applied is in the same state as for various orna purposes, viz., an extremely thin leaf. Before the cover of the book is quite finished, the volume is forcibly against the back, so as to make the fore-ed instead of concave. It is then placed in a press, wit exposed edge uppermost. The edge is scraped smooth teel, and is coated with a mixture of red chalk and e gold is blown out from small books, and spread cushion, where it is cut to the proper size by a ed knife. A camel-hair pencil is dipped into g mixed with water, and with this the partially the book is moistened; the gold is then taken up d of brush, and applied to the moistened edge, to tantly adheres. When all the three edges have n this way, and allowed to remain a very few e workman takes a burnisher formed of a very smooth d stone, and setting the end of the handle against his ubs the gold very forcibly—not (as might be sup- dangering its permanence, but giving it a high polish, by rubbing down the minute asperities which casioned by the paper beneath. The gold employed ter or less degree of solidity according to the cost- the book.

the edges we pass to the covers; and first, to *leather* The leather so employed is 'roan' or sheep, 'calf,' ' and 'Russia;' at least, these are the principal which alone we need make allusion here. These eather receive their colour at the dye-houses in Ber- where they are prepared; but 'roan-bound' books, hool-books, are often sprinkled with colour by the rs after the leather has been attached to the boards. purpose, the books are opened, and hung over two h a manner that the leaves may hang vertically down- ile the boards lie horizontal. A brush is dipped quid colour, and dashed or sprinkled on the cover ve a group of spots or wavy lines, at the taste of the

Calf and Russia leathers do not often receive any n of surface from the bookbinder; but Morocco is treated in the following manner:—The Morocco ployed for chair-covers and such purposes is made d-skin or sheep-skin according to its quality, and kled appearance, arising from the surface having bed very hard with a minutely grooved piece of Now for many purposes of bookbinding these are changed to a granulated appearance. Two leather being well wetted, and laid face to face, one is rubbed in different directions with a flat rk, by which the wrinkles are removed, and a slightly d texture produced.

rations produced on a leather-bound book by mps or dies are very diversified. The dies for y particular device are fixed to handles, and when ed are warmed in a gas-heated stove. Many are often used for one book, and the process of pro- oken ornamental device by using these tools by called 'blind-tooling.' But for many purposes it is venient to fasten a great number of small dies as vices to a metallic plate, by means of glue and cloth, mp the device from this fixed plate by means of a is called 'blocking.'

devices so produced on a book are called 'blind,' be employed; but much of the beauty of the work- depends on the tasteful introduction of this metal in rt or all of the pattern. The leather, as laid on is not in a fit state for receiving the gold without dification of surface. It first receives a coating of size; then two or three coatings of white of egg, slight glossiness is produced; and just before the e laid on, the surface is slightly moistened with gold, cut up into small pieces to suit the kind of is laid on the book with a flat camel-hair brush; amp or die, previously heated in the fire, is im- the gold; whereby two effects are produced at production of the device, and the fixing of the gold ler. A piece of soft rag, lightly passed over the ves the small superfluous fragments of gold, and gilt device clearly marked.

decoration of volumes bound in cloth, although a far lower level in respect to manual dexterity re costly binding in leather, has occupied much ithin the last few years, and has been one of the diffusing neat and even elegant volumes at a mar- w price. Cloth-binding, in fact, has been the germ t advance in the art—the application of machinery at had previously been effected by manual labour.

h with which books are covered is generally cotton ular kind, woven for the purpose. When the loth-binding came up, about twenty years ago, the sed in the unaltered state, with the warp and weft threads visibly crossing each other at right angles. But now the cloth is more generally so altered by an artificial embossment of surface, as to leave the threads barely visible, and to give to it a close resemblance to leather. We may instance a work published by the publishers of the present volume, viz., the 'Pictorial Museum of Animated Nature,' of which the red cloth covers have had imparted to them, by embossing, a remarkably close resemblance to the appearance of leather; a resemblance which, though now becoming very common, would have deceived many an eye a few years ago. This embossing is produced by drawing the cloth, while yet uncut for the purposes of binding, between two steel rollers, of which the surfaces are engraved with the required device, and which have a row of gas-jets through their hollow centre, so as to keep up a constant temperature. There must be as many pairs of rollers as there are different devices for embossing cloth; so that the number in large factories is very considerable. Some of the rollers are intended for the production of a uniform device over the whole surface of the cloth; while others have particular devices for each particular book, and are consequently planned with especial reference to the size of the volume. The rapidity with which books can be now bound in this way, is one great cause of the surprising cheapness at which they are often sold. Five or six years ago, Dr. Ure said that 'should Messrs. Westleys (one of the largest establishments in this line) receive five thousand volumes, on any given occasion, they can have them all ready for publication within the incredibly short period of two days;' and this has been more than borne out by what has since been done.

Other kinds of cloth-covers, especially those which are much decorated with gold, are stamped with the device *after* being pasted on the covers, instead of before; they are, in fact, *cases*, each one quite ready to affix to the book in a speedy manner after being stamped. Great pressure is required in this process, for the mill-board is required to yield to the force, as well as the cloth itself. The case is placed down flat on an iron bed heated with gas from beneath; above is a press, to the lower end of which is attached the stamping-die or device, face downwards. Great mechanical power is then brought to bear on it, and the press descends with force sufficient to impart the pattern to the cover, gilt or not, according to the circumstances of the case.

India-rubber Binding.—The last few years have witnessed the introduction of a singular mode of binding, arising out of the use of a cement or glue of caoutchouc, instead of sewing, for fastening the sheets of books together. In this process, the sheets are not allowed to retain the folded form customary in other kinds of binding; but the edges are cut on *all four* sides—on the back as well as the front, top, and bottom; the consequence of which is, that all the leaves are separated one from another. The group of leaves to form one volume is placed in a kind of gauge, by which convexity is given to the back-edge and concavity to the front; and a cement of caoutchouc is carefully applied to the back-edge, whereby all the leaves become cemented together. The subsequent operations are much the same as in other binding. There is a certain kind of flexibility resulting from this method, advantageous when the volume is thick. This method was introduced by Mr. Hancock, and in reference to it Dr. Ure remarks:—'For engravings, atlasses, and ledgers, this binding is admirably adapted, because it allows the pages to be displayed most freely, without the risk of dislocating the volume; but for security, three or four stitches should be made. The leaves of music-books bound with caoutchouc, when turned over lie flat at their whole extent, as if in loose sheets, and do not torment the musician like the leaves of the ordinary books, which are so ready to spring back again. Manuscripts and collections of letters which happen to have little or no margin left at the back for stitching them by, may be bound by Mr. Hancock's plan without the least encroachment upon the writing. The thickest ledgers thus bound open as easily as paper in quire, and may be written up to the innermost margin of the book without the least inconvenience.'

A method was patented six or seven years ago, of 'Cement-binding.' This consists in cementing the leaves or sheets together at the back, with a composition of isinglass, oil, sugar, and other ingredients; and in covering the cemented edges with a strip of calico similarly cemented. What advantages (if any) this possesses over the caoutchouc binding, does not appear: its principle is evidently the same.

BOOK TRADE. The substance of this notice is condensed, with slight alterations here and there, from a 'Postscript' to 'William Caxton: a Biography,' by Mr. Charles Knight, which gives a history of the 'Progress of the Press in England.' The subject may be divided into five periods:—

I. From the introduction of printing by Caxton to the accession of James I., 1603.
II. From 1603 to the Revolution, 1688.
III. From 1688 to the accession of George III., 1760.
IV. From 1760 to 1800.
V. From 1800 to 1843.

I. One of the earliest objects of the first printers was to preserve from further destruction the scattered manuscripts of the antient poets, orators, and historians. But after the first half-century of printing men of letters anxiously demanded copies of the antient classics. The Manutiuses and Stephenses and Plantins produced neat and compactly printed octavos and duodecimos, in addition to the larger books, instead of only producing the expensive folios of their predecessors. The instant that they did this, the foundations of literature were widened and deepened. They probably at first overrated the demand; indeed, we know they did so, and they suffered in consequence; but a new demand very soon followed upon the first demand for cheap copies of the antient classics. The first English Bible was bought up and burnt; those who bought the Bibles contributed capital for making new Bibles, and those who burnt the Bibles by so doing advertised them. The first printers of the Bible were however cautious—they did not see the number of readers upon which they were to rely for a sale. In 1540 Grafton printed only 500 copies of his complete edition of the Scriptures: and yet, so great was the rush to this new supply of the most important knowledge, that we have existing 326 editions of the English Bible, or parts of the Bible, printed between 1526 and 1600.

The early English printers did not attempt what the continental printers were doing for the antient classics. Down to 1540 no Greek book had appeared from an English press. Oxford had only printed a part of Cicero's Epistles; Cambridge, no antient writer whatever: only three or four old Roman writers had been reprinted, at that date, throughout England. The English nobility were, probably for more than the first half-century of English printing, the great encouragers of our press: they required translations and abridgements of the classics—versions of French and Italian romances, old chronicles, and helps to devout exercises. Caxton and his successors abundantly supplied these wants, and the impulse to most of their exertions was given by the growing demand for literary amusement on the part of the great. But the priests strove with the laity for the education of the people; and not only in Protestant but in Catholic countries, were schools and universities everywhere founded. Here again was a new source of employment for the press—A, B, C's, or Absies, Primers, Catechisms, Grammars, Dictionaries, were multiplied in every direction. Books became also during this period the tools of professional men. There were not many works of medicine, but a great many of law. The people too required instruction in the laws which they were required to obey; and thus the Statutes, mostly written in French, were translated and abridged by Rastell, an eminent law-printer. Even as early as the time of Caxton the press was employed to promulgate new laws.

Taken altogether, the activity of the press of England, during the first period of our inquiry, was very remarkable. To William Caxton, our first printer, are assigned 64 works.

Wynkyn de Worde, the able assistant and friend of Caxton, produced the large number of 408 books from 1493 to 1535, that is, upon an average, he printed 10 books in each year. To Richard Pynson, supposed to have been an assistant of Caxton, 212 works are assigned, between 1493 and 1531.

From the time of Caxton's press to that of Thomas Hacket, with whose name Dr. Dibdin's work concludes, we have the enumeration of 2926 books. The 'Typographical Antiquities' of Ames and Herbert comes down to a later period. They recorded the names of three hundred and fifty printers in England and Scotland, or of foreign printers engaged in producing books for England, who were working between 1474 and 1600. The same authors have recorded the titles (we have counted with sufficient accuracy to make the assertion) of nearly 10,000 distinct works printed among us during the same period. Many of these works however were only single sheets; but, on the other hand, there are doubtless many not here registered. Dividing the total number of books printed during these 130 years, we find that the average number of distinct works produced each year was 75.

Long after the invention of printing and in
into England, books were dear. In the 'Priv
counts of Elizabeth of York,' published by Sir
we find that, in 1505, twenty pence were given fo
and a 'Psalter.' In 1505 twenty pence would
half a load of barley, and were equal to six da
labourer. In 1516 'Fitzherbert's Abridgement,'
law-book, the first published, was sold for forty s
that time forty shillings would have bought th
Books gradually became cheaper as the printer
rely upon a larger number of purchasers. T
privileges that were given to individuals for pri
of books, during the reigns of Henry VIII., Mary
beth—although they were in accordance with
monopoly which characterized that age, and
granted to prevent the spread of books—offer a p
market was not large enough to enable the pro
the risk of competition. One with anothe
may be estimated to have been printed of each
the period we have been noticing; we think th
would have been quite adequate to the supply
number of readers—to many of whom the pow
was a novelty unsanctioned by the practice of th

II. The second period of the English press, fro
sion of James I. to the Revolution, was disting
dantry at one time, to which succeeded the rel
ous and political controversy; and then came t
literature of the Restoration. The press was
active during the politico-religious contest. Th
British Museum, a collection of 2000 volumes of
between the year 1640 and 1660, the whole nu
several publications amounts to the enormous
30,000. The number of impressions of new
nected with controversial subjects must have be
during this period.

After the Restoration an act of parliament wa
only twenty printers should practise their art i
We see by a petition to parliament in 1666, th
only 140 'working printers' in London. Th
enough to produce the kind of literature wh
required.

At the fire of London, in 1666, the booksl
about St. Paul's lost an immense stock of bo
amounting, according to Evelyn, to the value
which they were accustomed to stow in the va
tropolitan cathedral, and of other neighbouring c
that time the people were beginning to read
think;—and as new capital rushed in to replace
stock of books, there was once more considerab
printing. The laws that regulated the numbe
soon after fell into disuse, as they had long fa
tempt. We have before us a catalogue (the fir
this country) of 'all the books printed in Engl
dreadful fire, 1666, to the end of Trinity Term,
catalogue is continued to 1685, year by year.
—we may fairly say one-half—of these books, a
mons and tracts. The whole number of books p
the fourteen years from 1666 to 1680, we assert
ing, was 3550, of which 947 were divinity, 420
physic,—so that two-fifths of the whole were
books; 397 were school-books, and 253 on ge
graphy and navigation, including maps. Takin
of these fourteen years, the total number of w
yearly was 253; but deducting the reprints, pa
sermons, and maps, we may fairly assume th
average of new books was much under 100. C
of copies constituting an edition we have no rec
it must have been small, for the price of a book
can ascertain it, was considerable. In a catalogue
printed twenty-two years after the one we hav
we find that the ordinary cost of an octavo was

III. We have arrived at the third stage of this
from the Revolution to the accession of George

This period will ever be memorable in our h
creation, in great part, of periodical literature.
papers, and magazines, and reviews, and cycl
established, the people, even the middle class
fairly be said to have possessed themselves of
knowledge.

The publication of *intelligence* began durin
Charles I. and his Parliament. But the 'Mercu
days were little more than occasional pamphl
speaks of a 'Pamphlet of News.' Before th

eral London papers, regulated however by pri-
veyors of the press. Soon after the beginning
th century (1709) London had one daily paper,
imes a week, and one twice a week: this was
-duty was imposed on papers. After the stamp-
here were three daily papers, six weekly, and
s a week. Provincial newspapers had already
d in several places. In 1731, Cave, at his own
the first Magazine printed in England—the
' Its success was so great, that in the follow-
booksellers, who could not understand Cave's
y knew its value by experiment, set up a rival
he London.' In 1749 the first Review, 'The
started; and in a few years was followed by

cal literature of this period greatly reduced the
rely temporary books; and it had thus the ad-
rting to our literature a more solid character.
portionate deduction for the pamphlets inserted
ies already referred to, it still appears that the
f periodical literature, although constituting a
t branch of literary commerce, had in some de-
of narrowing the publication of new books; and
somely so. It appears from a 'Complete Cata-
ern Books published from the beginning of the
6,' from which 'all pamphlets and other tracts'
that in these fifty-seven years 5280 new works
ch exhibits only an average of ninety-three new
ar. It seems probable that the numbers of an
l had been increased; for, however strange it
he general prices of the works in this catalogue
not lower than in a priced catalogue which we
oks printed in the years 1702 and 1703. A
ed in the first half of the last century seems to
from 10s. to 12s. per volume; an octavo, from
l a duodecimo from 2s. 6d. to 3s. In the earlier
ave mentioned, pretty much the same prices
an excise had been laid upon paper; and the
orship, even for the humblest labours, were
an only account for this upon the principle,
hers of the first half of the eighteenth century
de, and, printing larger numbers, adapted their
xtension of the market. They also in many
their risk by publishing by subscription—a
lmost gone out of use from the change of
ssessing great advantages for the production of
This was in many respects the golden age for
en large and certain fortunes were made. Per-
his proceeded from the publishers aiming less
lty than excellence—selling *large impressions*
d not distracting the public with their noisy
the manufacture of new wares for the market
Publishers thus grew into higher influence in
had long ceased to carry their books to Bristol
fairs, or to hawk them about the country in
trade of books had gone into egular com-
s.

iod from the accession of George III. to the
ghteenth century is marked by the rapid in-
mand for popular literature, rather than by
features of originality in literary production.
ture spread on every side; newspapers, maga-
were multiplied; and the old system of selling
rs was extended to the rural districts and small
s. Of the *number-books* thus produced, the
ifferent, with a few exceptions; and the cost
was considerable. The principle however was
oped, of extending the market by coming into
tervals with fractions of a book, so that the
ner might lay by each week in a savings-bank
This was an important step, which has pro-
cts, but which is even now capable of a much
application than it has ever yet received.
tory of England' was one of the most success-
ks; it sold to the extent of 20,000 copies.
owth of the publication of *new* books is best
ining the catalogues of the latter part of the
tury, passing over the earlier years of the
III. In the 'Modern Catalogue of Books,'
e end of 1802, eleven years, we find that 4096
e published, exclusive of reprints not altered
so exclusive of pamphlets: deducting one-fifth
have an average of 372 new books per year.

This is a prodigious stride beyond the average of 93 per year of the previous period. From some cause or other, the selling-price of books had increased, in most cases 50 per cent., in others 100 per cent. The 2s. 6d. duodecimo had become 4s.; the 6s. octavo, 10s. 6d.; and the 12s. quarto, 1l. 1s. It would appear from this that the exclusive market was principally sought for new books; that the publishers of novelties did not rely upon the increasing number of readers; and that the periodical works constituted the principal supply of the many. The aggregate increase of the commerce in books must however have become enormous, when compared with the previous fifty years.

V. Of the last period—the most remarkable for the great extension of the commerce in books—we shall present the accounts of the first 27 years collectively, and of the last 16 years in detail.

The number of new publications issued from 1800 to 1827, including reprints altered in size and price, but excluding pamphlets, was, according to the London Catalogue, 19,860. Deducting one-fifth for the reprints, we have 15,888 new books in 27 years; showing an average of 588 new books per year, being an increase of 216 per year over the last 11 years of the previous century. Books however were still rising in price. The 4s. duodecimo of the former period became 6s., or was converted into a small octavo at 10s. 6d.; the 10s. 6d. octavo became 12s. or 14s., and the guinea quarto very commonly two guineas. The demand for new books, even at the very high cost of those days, was principally maintained by Reading Societies and Circulating Libraries. When these new modes of diffusing knowledge were first established, it was predicted that they would destroy the trade of publishing. But the Reading Societies and the Circulating Libraries, by enabling many to read new books at a small expense, created a much larger market than the desires of individual purchasers for ephemeral works could have formed; and a very large class of books was expressly produced for this market.

But a much larger class of book-buyers had sprung up, principally out of the middle ranks. For these a new species of literature had to be produced—that of books conveying sterling information in a popular form, and published at a very cheap rate. In the year 1827 'Constable's Miscellany' led the way in this novel attempt; in the same year the Society for the Diffusion of Useful Knowledge, which had been formed in November, 1826, commenced its operations; and several publishers of eminence soon directed their capital into the same channels. Subsequently editions of our great writers have been multiplied at very reasonable prices; and many a tradesman's and mechanic's house now contains a well-selected stock of books, which, through an annual expenditure of 2l. or 3l., has brought the means of intellectual improvement, and all the tranquil enjoyment that attends the practice of family reading, home to a man's own fireside.

The increasing desire for knowledge among the masses of the people was however not yet supplied. In 1832 the 'Penny Magazine' of the Society for the Diffusion of Useful Knowledge and 'Chambers's Journal' commenced to be published; and subsequently the 'Saturday Magazine.' The 'Penny Sheet' of the reign of Queen Anne was revived in the reign of William IV., with a much wider range of usefulness. It was said by some that the trade in books would be destroyed. They asserted also that the rewards of authorship would be destroyed, necessarily, at the same time. The 'Penny Cyclopædia' of the Society for the Diffusion of Useful Knowledge was deemed the most daring attempt at this double destruction. That work has returned about 150,000l. to the commerce of literature, and 40,000l. have been distributed amongst the authors and artists engaged in its production, of which sum more than three-fourths have been laboriously earned by the diligence of the writers.

There is a mode however of testing whether cheap literature has destroyed the publication of *new books*, without including reprints and pamphlets. We take the four years from 1829 to 1832, as computed by ourselves, from the London Catalogues; and the four years from 1839 to 1842, as computed by Mr. M'Culloch in the last edition of his 'Commercial Dictionary:'—

NEW WORKS, 1829 to 1832.

Years.	Vols.	Value of a single Copy at Publication price.		
1829	1413	£879	1s.	0d.
1830	1592	873	5	3
1831	1619	939	9	3
1832	1525	807	19	6

NEW WORKS, 1839 to 1842.

1839	2302	£966 11*s.* 2*d.*
1840	2091	943 3 5
1841	2011	902 5 9
1842	2193	968 2 6

In the four years ending 1832 were published, of new books, 6149 volumes; in the four years ending 1842 were published 8597 volumes. The cost of a single copy of the 6149 volumes was 3499*l.*; of the 8597 volumes, 3780*l.* The average price per volume in the first period was 11*s.* 5*d.*; in the second period, 8*s.* 9½*d.*

Mr. M'Culloch has also given the following table of reprints, from 1839 to 1842:—

REPRINTS AND NEW EDITIONS.

No. of Vols.	Value at Publication price.
773	£296 7*s.* 8*d.*
821	327 16 10
741	314 12 7
684	295 9 6

Mr. M'Culloch adds: 'From inquiries we have made with much care and labour, we find that, at an average of the four years ending with 1842, 2149 volumes of new works, and 755 volumes of new editions and reprints (exclusive of pamphlets and periodical publications), were annually published in Great Britain; and we have further ascertained that the publication price of the former was 8*s.* 9½*d.*, and of the latter 8*s.* 2*d.* a volume. Hence, if we suppose the average impression of each work to have been 750 copies, it will be seen that the total value of the new works annually produced, if they were sold at the publication price, would be 708,498*l.* 8*s.* 9*d.*, and that of the new editions and reprints, 231,218*l.* 15*s.* We believe however that if we estimate the price at which the entire impressions of both descriptions of works actually sell at 4*s.* a volume, we shall not be far from the mark; and if so, the real value of the books annually produced will be 435,600*l.* a-year.'

But the most remarkable characteristic of the press of this country is its *periodical* literature. It might be asserted, without exaggeration, that the periodical works issued in Great Britain during one year comprise more sheets than all the books printed in Europe from the period of Gutenberg to the year 1500.

The number of *weekly periodical works* (not newspapers) issued in London on Saturday, May 4, 1844, was about sixty. Of these the weekly sale of the more important amounts to little less than 300,000 copies, or about fifteen millions annually. The greater number of these are devoted to the supply of persons who have only a very small sum to expend weekly upon their home reading.

Of the weekly publications, independent of the sale of many of them in monthly parts, we may fairly estimate that the annual returns are little short of 100,000*l.*

The *monthly* issue of periodical literature from London is unequalled by any similar commercial operation in Europe. 227 monthly periodical works were sent out on the last day of May, 1844, to every corner of the United Kingdom, from Paternoster Row. There are also 38 periodical works published quarterly: making a total of 265.

A bookseller, who has been many years conversant with the industry of the great literary hive of London on Magazine-day, has favoured us with the following computations, which we have every reason to believe perfectly accurate:—

The periodical works sold on the last day of the month amount to 500,000 copies.

The amount of cash expended in the purchase of these 500,000 copies is 25,000*l.*

The parcels dispatched into the country, of which very few remain over the day, are 2000.

The annual returns of periodical works, according to our estimate, amount to 300,000*l.* Mr. M'Culloch estimates them at 264,000*l.*

The number of newspapers published in the United Kingdom, in the year 1843, the returns of which can be obtained with the greatest accuracy through the Stamp Office, was 447. The stamps consumed by them in that year were 60,592,001. Their proportions are as follows:—

1843.

79	London newspapers	31,692,092
212	English provincial	17,058,056
8	Welsh	339,500
69	Scotch	5,027,589
79	Irish	6,474,764
447		60,592,001

The average price of these papers is, as ne
5*d.*; so that the sum annually expended in
about 1,250,000*l.* The quantity of paper req
annual supply of these newspapers is 121,184
which paper is of an enormous size. In a petitio
in 1471, from Sweynheim and Pannartz, print
they bitterly complain of the want of demand fo
their stock amounting to 12,000 volumes;
'You will admire how and where we could proc
quantity of paper, or even rags, for such a
lumes.' About 1200 reams of paper would have
the poor printers' stock. Such are the changes
turies.

We recapitulate these estimated annual return
merce of the press:—

New books and reprints	£43
Weekly publications, not newspapers	10
Monthly publications	30
Newspapers	1,2
	£2,

The literary returns of the United Kingdom,
unquestionably little more than 100,000*l.* per
has multiplied them twenty-fold? Is it the
the widening of the market—the exclusion or th
knowledge? The whole course of our litera
that of a gradual and certain spread from the few
—from a luxury to a necessary—as much so as
the cotton or the silk trade. Henry VIII. pa
for a silk gown for Anne Boleyn—a sum equal
a yard of our day. Upon whom do the silk
rely—upon the few Anne Boleyns, or the thous
buy a silk gown at half-a-crown a yard? The
chine has done for the commerce of literature
and the Jacquard-loom have done for the com
It has made literature accessible to all.

(For an account of the 'Book Trade of
Journal of London Statistical Society, vol.
work, vol. vi., for a notice of the 'Book Trade
As to newspapers, see **Newspapers**, P. C.)

BORA'GO, a genus of plants, the type of
order Borągineæ, and placed in the tribe An
tribe is distinguished by possessing four
hypogynous disk, with an excavated space
tumid ring at their base. The genus Borago ha
five deep segments; a rotate corolla with the tu
the throat with short, erect, emarginate scales;
mens, the filaments bifid, the inner fork bearing
the anthers linear, lanceolate, connivent in the
All the species are rough plants, with fusiform
or lanceolate leaves, and blue, panicled, drooping

B. officinalis, Common Borage, has the lowe
vate, obtuse, attenuated below; the segments of
ovate, acute, flat, spreading. The flowers are
whole plant is hispid with tubercled hairs. This
to be originally a native of Aleppo, but is no
in most countries of Europe. In Great Britain
common on rubbish and in waste places. Borage
a great reputation as a cordial. Its virtues in this
have been overrated, as, in common with the
which it belongs, it possesses no very active prop
tissues contain gum, and on this account it may
demulcent. It also possesses nitrate of potash
other plants of the order, which renders it
fuge. Withering says the young tender leaves
as salads or as a potherb. G. Don has described
species: *B. crassifolia*, a native of Persia; *B*
Numidia; and *B. laxiflora*, a native of Corsica
all plants of the easiest culture. They may be
pagated by seed, which should be sown in the
They form pretty border-flowers.

(Babington, *Manual of British Botany*; G
dener s Dictionary.)

BORDER WARRANT is a writ issued by
the Scottish border counties, to apprehend a pers
in England who has incurred debt in Scotland,
happen to be in the sheriffs' jurisdiction. It is
being made to the debt, and to the party's du
principle of arrest in mesne process was never
Scotland, farther than to the extent of apprehen
about to escape from the country until they sho
debt or find security for it, and the border warran
of the system.

RDO'NE, PARIS (Cavaliere), one of the most distin-
d painters of the Venetian school, especially in portrait,
rn of a noble family at Treviso in 1566. He was for a
ime the pupil of Titian in Venice, but they disagreed
arated, and Bordone chose afterwards Giorgione as his
in preference to Titian, but he eventually adopted a
f his own, which however did not differ in anything
from the styles of these two great Venetian masters.
e's works are eminently distinguished for all the
s of the Venetian school, and are not at all deficient in
or invention. One of his best works is the Martyr-
St. Andrew, in the church of San Giobbe at Venice.
mentions the picture formerly in the Scuola di San
now in the Academy, of the Fisherman presenting the
e had received from that Saint to the Doge, as his mas-
e; but though the colouring is rich and the general
ion good, the composition is bad, the point of sight, or
ntal line, is placed so high that the spectator has a kind
's-eye view of the scene; the figures are small; the
ound is rich architecture, but the perspective is incor-
It was taken to Paris by the French during the war,
restored to Venice in 1815. His picture of Paradise,
ly in the church of Ogni Santi at Treviso, is now also
Venetian Academy. There is in the Dresden gallery
iful Holy Family by Bordone, and a picture of Apollo
Lyre, and Marsyas and Midas in the background.
e spent some time in the service of Francis I. in
: he died in Venice, in 1570, according to the best
ities, but various dates are given both for his birth and

netti, *Della Pittura Veneziana*; Ridolfi, *Le Maraviglie*
rte, &c.)

RING INSTRUMENTS. The boring instruments
nly used by the carpenter consist of awls, or brad-awls,
, augers, and bits of various kinds. The first-mentioned,
re only used for very small holes, and generally in soft
re solid cylindrical tools ground to a straight chisel-
edge, and mounted in round handles, by which they
ed into the wood with an alternating semi-rotatory
taking care, in commencing the hole, to apply the
aped end at right angles to the grain, so as to cut the
nstead of simply entering between them by pressure.
are cylindrical tools hollowed out on one side, and termi-
a short conical screw with a sharp worm tapering off
t. These, to afford more power, are mounted in trans-
ndles. Being pressed into the wood with a rotatory
from left to right, the conical screw, directed by its
point, cuts its way into the wood, while the sharp
the semi-cylindrical cavity or hollow in the side of
let detaches and clears away all the cuttings produced
ction of the screw. The borings enter the cavity in
of the gimlet, and either work their way out of the
it proceeds or are withdrawn with it. Gimlets are
various sizes, but are seldom used for boring holes
a quarter of an inch, or from that to three-eighths,
eter. *Augers* bear a general resemblance to gimlets,
so large that their transverse handles are worked by
nds, while gimlets are used with one hand only. Some-
the cutting parts are made very similar to those of a
but in other cases there is no screw, the end of the
ent being formed more like a centre-bit. In other
gain, the semi-cylindrical hollow or cavity which re-
the borings, and by the sharp edge of which the sides
hole are trimmed, is made to wind somewhat spirally
the axis of the instrument, which then gradually tapers
conical screw. Both augers and gimlets are made
at the upper part, near the handle, than near the end,
the edge of the shell-like cavity acts as a cutter, by
rrangement they may be readily turned even in very
oles. *Bits* are boring instruments made to fit into a
rank-shaped handle termed a brace, by which they may
lied with greater power and precision than gimlets or
and are therefore preferred for large holes, for all
n which accuracy is necessary, and for boring hard
They are made in sets, and are readily fixed in or
ed from the brace by means of a spring. The principal
as enumerated in Nicholson's *Architectural Dictionary*
e 'Bit'), are *shell-bits*, which resemble such augers as
o screw at the end, but simply an interior cylindrical
ity, with a cutting edge. *Centre-bits*, which, as their
mports, turn upon a centre or projecting point in the
of their breadth as upon an axis: they are of a flat or
like shape, and have a vertical cutting edge projecting from the extremity at one side, so as to cut the wood across the grain round the circumference of the hole, while on the opposite side of the axis or centre is a radial cutter projecting obliquely, but almost horizontally, from the face of the bit, which, as the instrument is turned round, ploughs away, in the form of a spiral shaving, the cylindrical core left by the action of the vertical cutter. Such an instrument may be compared to a revolving plough, the vertical cutter representing the coulter, and the radial cutter the ploughshare; and, as it cuts clean away the whole of the wood, it is well adapted for boring large holes with but little risk of splitting. *Taper shell-bits* are used to enlarge holes in wood; and *rimers* are pyramidal bits, with a vertical angle of about 3½°, the cross section of which is either polygonal or semicircular, used in like way for enlarging holes in brass or iron: their action is that of scraping rather than boring; and those of a polygonal shape are intended especially for iron. Instruments of the same kind, mounted for use in the hand instead of a brace, are called *broaches*. *Countersinks* are pyramidal bits with a vertical angle of about 90°, used for widening the upper part of screw-holes, so as to allow the heads of screws to be countersunk into them. Those for iron have generally but two cutting or rather scraping edges; but those for wood and the softer metals have a greater number, ranging up to twelve, formed on the conical surface of the bit. A screw-driver is frequently added to a set of boring-bits, and used, like them, in the brace.

Small holes in metal are usually bored with *drills* or boring-bits formed with scraping rather than cutting edges. These frequently resemble the countersinks used for iron, but are sometimes made more in the shape of a centre-bit. They are occasionally used in a brace, and where the pressure required is greater than can be given by the common brace, which is placed against the chest of the workman, an apparatus termed a press-drill is used, in which the brace is pressed to its work by a weighted lever. Some drills are used in a kind of stock which receives an alternating rotatory motion from a bow worked by hand, the tight string of which is passed round a pulley fixed upon the stock, and rubbed with resin to prevent the slipping of the string. Another simple and effective mode of working a drill is by fixing it in the lower extremity of a vertical spindle or stock, which is loaded near its lower extremity with a heavy circular mass of metal to give it an impetus. A strong cord is passed through a hole in the upper extremity of the spindle, and is attached to the opposite ends of a transverse piece of wood which, by means of a hole in the centre, is slipped upon the spindle, and is capable of moving up and down freely upon it. Before using the drill the transverse piece of wood must be turned round two or three times, so as to wind the cord spirally round the upper part of the spindle. The drill being then applied to the required place, and the spindle placed in a vertical position, the transverse bar is pressed smartly downwards by the hand. By this action the cord is untwisted, and the spindle is made to revolve with such rapidity that it gains an impetus sufficient to wind the cord round it in the opposite direction, and thereby to lift up the transverse bar, the pressure on which is relaxed for the moment. A fresh application of pressure again unwinds the cord, and occasions the spindle to revolve in the opposite direction, and by a repetition of the like operation the spindle is kept in very rapid motion, though revolving alternately in opposite directions. This ingenious *torsion drill-stock* is derived from the native smiths of Ceylon.

Common drills are frequently used, especially for very delicate purposes, in a lathe, and all the larger operations of metal boring, such as the boring of musket-barrels, cannon, and the cylinders of pumps and steam-engines, are performed by boring machinery on the principle of the lathe. The boring of guns is briefly alluded to under CANNON, P.C., p. 242. Musket-barrels are bored with a cylindrical plug of tempered steel about an inch and a half long, with its surface cut like a perpetual screw, with a flat thread about a quarter of an inch wide, with a very slight obliquity. The edges of this thread are sharp, and render it a very efficient boring implement, which, it must be remembered, has not to make a hole, but simply to remove inequalities from the inner surface of a cylinder formed by welding. In the early manufacture of steam-engines and similar machinery the difficulty of procuring accurate cylinders formed a great obstacle to improvement. The old method of boring cylinders and pump-barrels resembled the plan adopted for boring wooden water-pipes, which was to place the pipe in a carriage made to move forward as nearly as possible in the direction of its axis, against a revolving borer consisting of several cutters fixed in a solid wheel; but, notwithstanding the improvements introduced at the Carron foundry, by which the process was greatly improved, the plan was found essentially defective, as unavoidable irregularities in the casting affected the subsequent boring and polishing. This defect was obviated by the invention, by Mr. John Wilkinson, of Bersham, of a plan by which the borer was made to advance into the cylinder along an inflexible rod, so that the accuracy of the boring was made dependent upon the truth of the guide-rod, and totally independent of the accuracy of the casting. This invention formed a most important auxiliary to the success of Watt's improvements on the steam-engine, and it has been followed up by the introduction of machinery capable of performing the most stupendous operations of boring and turning in metal with mathematical accuracy. In addition to the mode above alluded to of boring wooden pipes, such, as well as stone pipes, have been made by cutting out the core with a cylindrical saw; a plan introduced in 1810 by Mr. Murdock.

The boring of rocks for blasting is described in MINING, P. C., p. 241; and under ARTESIAN WELLS, P. C., p. 412, is a statement of the circumstances under which similar borings are made to a very great depth for the purpose of finding water. The operation of boring such wells is performed with a number of variously fashioned chisels or jumpers, augers, and similar instruments, attached to the lower end of an iron rod formed of many lengths which screw into one another. To the upper joint of this compound rod is attached a transverse handle worked by two men, by which the boring instrument may either be turned round where an auger is used, or raised and turned a little way between each stroke where, as in cutting through rock, the hole must be formed more by chipping than boring. In boring through soft strata a kind of cylindrical auger is used, which, when full of earth, must be drawn up and cleared; and a similar instrument is employed to remove the chippings produced by the action of the chisels employed to perforate rock. As the weight of the rods required in boring a hole of great depth would render them unmanageable by hand, a triangle of poles, supporting tackle for raising the boring-rod, is erected over the hole, and, to facilitate the cutting or chipping action required to penetrate rock, an elastic wooden pole fixed at one end only, by inserting it in a pile of heavy stones, is placed horizontally over the hole, and provided with a chain by which the boring-rod may be suspended from it. The vibration of this pole, when set in motion by manual force, gives the required up-and-down motion to the rod, while the turning of the transverse handle causes the chisel or jumper continually to vary its stroke. To facilitate the working of this apparatus, it is usual to commence the operation of boring by forming a circular excavation about six or eight feet deep, and five or six feet in diameter, at the bottom of which a floor of planks may be laid for the borers to walk round upon. They may thus pursue their labours without being inconvenienced by the spring pole and triangle or shears erected over the excavation. A minute account of the mode of operation, with cuts of the various implements employed for boring, and ingenious contrivances for extracting broken rods or borers, for raising sand and water which may be too fluid to come up in the auger, for putting down, raising up, or straightening the pipes used to line the boring, and for meeting all the contingencies liable to arise in the course of the work, is given in Dr. Ure's *Dictionary of Arts, Manufactures, and Mines*, under the title 'Artesian Wells.' An interesting illustration of the difficulties sometimes experienced in this operation is given in the 'Penny Magazine' for November 13, 1841, in an account of the Artesian well at Grenelle, a suburb of Paris, which is carried to the immense depth of 602 yards, or more than one-third of a mile. Though, under ordinary circumstances, the operation is carried on with facility, much time and labour are lost, owing to the necessity of withdrawing and unscrewing the rod every time that the boring tool becomes filled with earth; to obviate which inconvenience Hebert devised a kind of boring-instrument which might be readily slid up and down the rod, so that the charged auger alone would have to be raised, without disturbing a single joint of the rod. Of this, together with a few of the commoner boring-instruments, the inventor gives a description in his *Engineer's and Mechanic's Encyclopædia* (article 'Boring-machines'), vol. i. pp. 232-234. In the 'Transactions' of the Society of Arts, vol. xix. pp. 165-168, is a description of a hollow cylindrical auger for boring peat, for the purpose of draining boggy lands, which, by cutting out and completely removing a column of peat about six inches in diameter, prod
which will maintain a free passage for water for
siderable time.

BORNIA, a genus of fossil plants from the
tion, including Bornia equisetiformis, which L
in Asterophyllites (*Foss. Flora*, t. 124).

BOROUGH COURTS OF RECORD.
OF ENGLAND AND WALES, P. C.]

BORRERA, a genus of plants belonging to
order of lichens, named by Acharius, in honour
Borrer, F.L.S., who has very successfully cultiv
gamic Botany, especially that of Great Britain
of Cinchonaceous plants has also been named after
[BORRERIA, P. C. S.]

BORRERIA, a genus of plants named in
William Borrer, F.L.S., an eminent living b
belongs to the natural order Cinchonaceæ, and
lowing characters:—Calyx with an ovate tube, a
nent limb which is parted into 2-4 teeth; corolla
or funnel-shaped, 4-lobed; stamens 4, exserted
stigma bifid or undivided; capsule crowned by
the calyx, 2-celled, opening from the apex at the
when mature, but without any dissepiment; co
1-seeded, opening by a longitudinal chink
species, which are very numerous, are most of th
undershrubs, and are nearly all natives of tropical

B. ferruginea, has an herbaceous, hard, erect, br
tetragonal hairy branches; oblong, acute, obliquel
leaves, scabrous above and pale beneath, and sca
nerves from hairs; bristles of the stipules the
sheath; whorls of flowers globose, terminal, a
capsule downy, crowned by the four subulate
calyx. This plant is a native of Brazil, in elev
in the provinces of Minas Geraes and St. Paul.
is called *Poaya*, and *Poaya da Maya* at Cape
is one of the plants which yield a bastard ipecac
roots are of a brown colour, and when taken pro
and vomiting.

B. Poaya is glabrous, and has an herbaceous
gonal stem; sessile oblong-elliptic acute leave
6-nerved on both sides of the midrib; the stipu
many long bristles; whorls of flowers capitate,
axillary, and a larger terminal one; lobes of calyx
linear acute, longer than the ovarium; corolla
thers exserted. A native of Brazil in elevated
has blue flowers. The roots are white, and pro
when taken, and are consequently frequently
ipecacuanha. The leaves when chewed have a
first, and afterwards an acid one; a decoction
sometimes employed in the cure of colic. Upwa
species of this genus have been described, of wh
above two appear to be used by man. They m
vated in this country in greenhouses. A light so
best, and cuttings of the shrubby species readily
under a hand-glass in heat. The herbaceous sp
the same treatment as other tender annuals.

(Don, *Gardeners' Dictionary*.)

BOS (Fossil). The numerous remains of Bo
peds dug up in the superficial deposits of Europe
offer analogies to the urus and to the common ox.
and bones of the gigantic urus priscus (fossil a
been found in freshwater deposits in Yorkshire,
shire, Essex, &c. Bos primigenius has been fou
Bay, and at Clacton in Essex, in drift beds above
clay, and in a fluviatile deposit at Melksham in
Peterborough, and in many other localities. A sm
bos longifrons, occurs in Ireland, where it was
out by Mr. R. Ball.

(Owen 'On Fossil Mammalia,' *Report of Briti*
1843.)

BOSTON, THOMAS, a Scottish divine,
with a large class of religious thinkers, was born
lage of Dunse, in Berwickshire, on the 7th of M
He received the rudiments of his education at his
and afterwards attended the University of Edinb
relations were poor, and his education appears to
conducted in the face of impediments from pe
culties. After acting for some time as a private
obtained a licence as a probationer on the 16th of
His first efforts to obtain an ecclesiastical benefice,
subsequent to the establishment of the Presbyteri
the Revolution, appear to have been baffled by th
entertained towards his anti-patronage and ultra-

He was ordained, on the 21st of September, 1699,
he parish of Simprin, near his native place. In
'translated,' as it is termed, to the extensive but
ed pastoral parish of Ettrick. He was a member
ral Assembly of 1703. While this assembly was
of discussions on matters not likely to be accept-
ourt, it was dissolved by the commissioner, and the
vho, according to the theoretical principles of that
body, is the conductor of its routine, sanctioned
concluding the proceedings. Boston and others
tested against this compromise of clerical inde-
He was opposed to the oath of abjuration, and in
ll measures which created restrictions on the inde-
vements of the ecclesiastical body to which he
He joined those who supported the doctrines of
w of Modern Divinity,' in the controversy in the
urch on that work. He died on the 20th of May,
was a very voluminous writer, and his works are
opular in Scotland, and among the Presbyterians
His well known 'Fourfold State,' which was
in 1720, had a curious literary fate. It had been
tructed by a person whom he had engaged to correct
at the author, scarcely recognising his own work,
he book till he issued a genuine edition. The
book in full is, 'Human Nature in its Fourfold
Primitive Integrity subsisting in the Parents of
Paradise; Entire Depravation subsisting in the
e; Begun Recovery subsisting in the Regenerate;
mate Happiness or Misery subsisting in all Man-
Future State.' In 1776 there was published
the Life, Time, and Writings of Thomas Bos-
into Twelve Periods, written by Himself and
his Children;' a work containing quite as ample
f this writer as the majority of readers will wish

Y, FOSSIL. The progress now making in the
of the structure of fossil plants by microscopists, is
nduce a postponement of the results till a later
ANTS, FOSSIL, P. C. S.]

DE'NDRON. [ULODENDRON, P. C. S.]

CHIUM, a genus of ferns belonging to the sub-
daceæ and the tribe Ophioglosseæ of that family.
t thecæ disposed in a compound spike attached
r bi-pinnate frond. There is only one species a
eat Britain, the *B. Lunaria*, Common Moon-
a solitary pinnate frond, with notched or crenate,
-shaped pinnæ. This is not a very conspicuous
been observed in almost every part of Great
grows on dry open heaths, elevated pastures, and
which are generally shunned by other species of

times the ferns had a great reputation in medi-
much on account of their obvious as their sup-
. The lunate-shape of the pinnæ of this fern
une and was the origin of much of the supersti-
ion with which it was regarded. When used it
by the light of the moon. Gerarde says 'It is
eal green and fresh wounds. It hath been used
lchymists and witches to do wonders withall,
it will loose locks and make them to fall from
orses that grase where it doth grow, and hath
of them Martagon, whereas in truth they are
y dreams and illusions; but it is singular for
oresaid.' Its healing powers are now however
garded as its magical ones.
icum, the Rattlesnake Fern, is a native of North
l is the largest of the species. It is called rattle-
om the fact of its growing in places where this
ptile is usually found. The other species of
re mostly natives of North America.
edia of Plants; Newman, *History of British*

CARLO GIUSEPPE, born at S. Giorgio
in 1766, studied medicine in the University of
ok a doctor's degree in 1786. He also mani-
ly turn for literary and historical studies, in which
s master Carlo Tenivelli, a writer of some note
. At the outbreak of the French revolution,
any more of his countrymen, trusted in the pro-
promises of liberty and universal happiness which
yond the Alps. He committed himself so far in
ionary plot, that he was arrested and confined in
Turin for two years, after which, being liberated, he emigrated to France. After living some time at Grenoble he was appointed surgeon to the French army called 'of the Alps,' and stationed at Gap. In 1796, after the first success of Bonaparte, he followed the French through their campaigns in Lombardy, and in the following year was present in Venice at the fall of that antient republic, a catastrophe which he has related with lively grief and indignation in his history. From Venice he sailed with the expedition that went to take possession of Corfú and the other Venetian islands in the name of France. At Corfú he wrote a professional work on the military hospital of that garrison, with digressions on the climate and the natural history of the island. In 1798 Botta returned to Italy, and was employed in his professional capacity with a detachment of Cisalpine troops stationed in the Valtellina, where he wrote a disquisition, in the form of a letter, on the analytical nosography of Pinel. At the end of that year, when the French Directory resolved on driving away their subservient though forced ally the King of Sardinia from Piedmont, General Joubert, who executed the mandate, nominated Botta one of the members of the provisional government of Piedmont, a government which was driven away a few months after by the victorious Suvarow. Botta was then obliged to emigrate to France a second time, and he was appointed surgeon to the new army of the Alps. He returned to Italy after the battle of Marengo, June, 1800, and was appointed member of the Consulta, or council of administration for Piedmont. The country was in a deplorable state, after being drained by so many revolutions and invasions; the French acted as imperious taskmasters, and the council had few means of doing good. In the 20th book of his history Botta describes at length the calamities of the times. One benefit however he and his colleagues managed to confer upon their native country, and this was, to secure out of the public domain an annual permanent income of half a million of francs, for the support of the University, Colleges, and Academy of Sciences of Turin. The benefit remained and survived all subsequent political vicissitudes.

When Napoleon resolved, in 1803, to unite, definitively, Piedmont to France, Botta was one of the deputation sent to Paris on the occasion. He then published a 'Précis Historique de la Maison de Savoie et du Piémont.' In 1804 he was elected deputy to the French legislative body, for the department of the Dora, and in consequence removed to Paris. He retained his seat in the legislative body, having been re-elected for the department of the Loire, till the fall of Napoleon. The office of legislator, as is well known, was a complete sinecure in France under Napoleon's empire, and Botta availed himself of his ample leisure in preparing for the press his history of the North American revolution and war of independence, which he had begun during his first French emigration, and which he published at Paris in 1810: 'Storia della Guerra dell' Indipendenza d'America.' The author lost by the publication, but a few years after his translator gained about five thousand crowns by the French edition of the work.

In April, 1814, Botta, with the other members of the legislative body, swore allegiance to the Bourbon dynasty. At the end of March, 1815, Napoleon's restored government appointed him Rector of the University of Nancy, which seems to show that he had turned round again with the crowd. He resigned his rectorship at the second Bourbon restoration, but was appointed instead Rector of the University of Rouen, an office which he did not retain long, for in 1816 he was living at Paris as a foreigner without employment or pension. He then applied himself to write a contemporary history of Italy during the French occupation, an arduous task amidst the growling of angry passions which had not yet had time to subside. He determined to write 'the whole truth,' as far as his means of information went; to speak with honest sincerity, not only of princes and ministers, but also of the people; to flatter no party; to calumniate no enemy;—a novel course after emerging from the inquisitorial system of Napoleon, when subserviency alone was praised, and resistance and independence were vituperated and hunted down. Botta communicated his intention to some friends, who told him that 'he either dared not or could not abide by his determination, and that even supposing that he dared and could, he ought not to do it.' Luckily he persisted, and disregarding the prejudices of men of all parties, absolutists and liberals, patriots and Bonapartists, freethinkers and ultramontanists, he produced a book which went far to redeem Italian literature from the charge of almost Oriental servility which it had incurred during the period of Napoleon's reign. Alone perhaps among the nations of Europe, the Italians, or rather, a numerous and active class among them, had, or thought they had, reason to regret the fall of that reign, when they found themselves placed in a false position; their wishes and national aspirations being opposed to those of the other European nations who had risen against the despotism of the conqueror. Italy had enjoyed fifteen years of comparative tranquillity; it had trusted Napoleon's vague promises of an eventual national union of the whole peninsula, which however appears to have been far removed from his thoughts; and it had meantime obtained considerable internal improvements in its municipal and local institutions. No wonder that the bold, the strong, the aspiring, among the Italians, should regret Napoleon and confound his cause, as many of the French have done and are still doing, with that of social progress and freedom. Botta displeased many of these by his plain speaking, nor did he care to conciliate the advocates of old absolutism. He published his work at Paris in 1824: 'Storia d' Italia dal 1789 al 1814,' 4 vols. 8vo. The book was assailed by strictures and denunciations, some of them very abusive and personal; but it stood its ground, went through numerous editions, both in Italy and abroad, and it has long since taken its place in every Italian library. The work is one of lasting interest: the author excels in the description of stirring events, the bustle of the camp, the alarms of a siege, the din and tumult of popular insurrections, the calamities of the devoted inhabitants—the victims of famine, pestilence, or the sword. His account of the insidious arts used by the French directory towards the disarmed court of Turin, that of the fall of Venice, the terrible re-action of 1799, the march of Suvarow, the battle of Novi, the siege of Genoa, the dreadful massacres of Naples, the pass of the Splugen by Macdonald's army, Napoleon's coronation at Milan, the war on the coast of Albania between the French and Ali Pasha, the horrors of the war of extermination in Calabria, are all masterly sketches. His style however is upon the whole unequal, and his sentiments at times seem inconsistent with one another. He is not always successful in drawing individual characters, or in scanning the internal workings of men. Some of his battle descriptions are somewhat confused. There is also a disproportion between the various parts of the work; twenty books are bestowed upon the Italian wars and vicissitudes from 1792 to the peace of Luneville in 1801, and only seven upon the subsequent period down to 1814. But notwithstanding these faults, Botta's history is a noble work, and one that does honour to Italian literature.

Encouraged by the success of this work, a certain number of Italian and French lovers of literature urged Botta to attempt a continuation of Guicciardini's history of Italy, from 1530, down to 1789, so that the end should meet the beginning of his contemporary history. These friends made a subscription among themselves sufficient to allow the writer a decent annual income during the time that he should be engaged in his laborious undertaking. Botta accepted the task in 1826, and he completed it at the end of 1830: 'Storia d' Italia in Continuazione al Guicciardini, sino al 1789,' 10 vols. 8vo., Paris, 1832. This larger work was received with applause, owing in part to the author's already established reputation as an historian. The Academy of La Crusca bestowed on the author its decennial prize, and Charles Albert, king of Sardinia, created him a knight and gave him a pension. This was the first token of favour obtained by Botta from any government for his writings, and, it is well to observe, that it was for the old and not for the contemporary history that it was granted, and therefore could not affect Botta's character for independence. In fact Botta lived and died poor. In 1832 Botta revisited his native Piedmont, and was very favourably received there. He afterwards returned to France, where he made an Italian translation of the journal of a French maritime expedition of discovery round the globe, which one of his sons accompanied in a medical capacity, and also as a naturalist. The translation was published after the father's death: 'Viaggio intorno al Globo, principalmente alla California e alle isole Sandwich, negli anni 1826-29, di A. Duhaut Cilly; con Note del giovane Botta,' Turin, 1841. He was invited to write the Life of Fra Paolo Sarpi, but he refused, saying that he was too old. He died at Paris, in August, 1837. His native town S. Giorgio has raised him a monument.

Besides the works mentioned in this article, Botta wrote—1, 'Il Camillo, o Vejo conquistato,' a poem, Paris, 1815; 2, 'Storia dei Popoli Italiani da Costantino fino à Napoleone,' a compilation published first in French in 1825, and afterwards in Italian in 1826. His history of American independence
has been translated into English, by Otis, and has b
praised in the United States. As a literary work
is much inferior in merit to the two histories of It

(Tipaldo, *Biografia degli Italiani Illustri*; *Fo*
terly Review, No. I., July, 1827, article on Bott
of Italy;' and in No. xxxiii. of the same Journal,
his 'Continuation of Guicciardini.'

BOTTOMRY BOND. [Bottomry, P. C.]

BOUCHARDON, EDME, a distinguished F
tor, was born at Chaumont in Bassigny, in 16
instructed in his youth by his father, who was
sculptor and architect; and, after he had made s
gress, he entered the school of the younger Cou
where he soon distinguished himself, and obtain
prize of the Royal Academy in 1722. By this p
entitled to study for a limited period at Rome, at
of the French government, in the French academy
there by Louis XIV. Bouchardon remained at
years, during which time he was much employed
in busts, and he was selected to execute the
Clement XI.; but, being recalled by the French
about the same time, he did not execute it. He
Paris in 1732: in the year following he was elec
1744 a member, and in 1746 a professor, of the
Painting and Sculpture. He died at Paris in 176

Bouchardon's principal works were the Font
nelle, and the equestrian statue of Louis XV. T
de Grenelle is one of the finest in Paris; it was co
1739 and finished in 1745: the inscription is
Fleury. The authorities of Paris, by whose order
were so well satisfied with its execution, that they
chardon, in 1746, a pension for life of 1500
statue of Louis XV., which was of marble, was
Place Louis XV. in 1763, and was destroyed by
in 1792. Bouchardon was occupied in its exe
twelve years, yet it was unfinished when he died:
was executed by Pigal, who was chosen by Bouc
self to complete the monument. It was engraved
There are also some statues by Bouchardon in
S. Sulpice, and in the gardens of Versailles, Choi
Bois. He was sculptor to the king. Many of
sketches have been engraved, and there are a few
his own hand.

J. J. Preisler engraved fifty antient statues fr
by him. Count Caylus engraved many others, b
of Bouchardon's original works; he also wrote
chardon. Bouchardon had a younger brother, wh
to the King of Sweden, in which country he die

(L'Abbé de Fontenai, *Dictionnaire des Artistes*,
ken, *Dictionnaire des Artistes*, &c.; Watelet a
Dictionnaire des Arts, &c.

BOUCHER, FRANÇOIS, succeeded Vanlo
painter to Louis XV. He was born at Paris in
under Le Moine, and at the age of nineteen obt
prize of the French Academy of Painting, by w
by precedent entitled to study in Rome at the ex
government; a privilege however which he di
He went to Rome at his own expense for a sho
returned to Paris in 1731, and in 1735 was elect
of the academy. He died in 1768, or, accordin
1770, director of the academy.

Boucher was a painter of very great ability, an
ordinary facility of execution, but he disregarde
rect principle, and devoted himself entirely to
effect, which consisted in a mere variegated tissue
shade. His figures are utterly void of expressio
jects were chiefly mythological, amorous, and pa
painted figures and landscapes with equal facility
ruption of pure taste, partly effected by Watte
accomplished by the works of Boucher, for th
time a great popular favourite, his style has been
condemned in the very strongest terms, even by h
trymen, especially by Watelet and Diderot.
called the Anacreon of painters, a compliment (i
though it may apply to Boucher's subjects, ca
his execution of them. His designs are extreme
amounting to several thousands, and a great m
have been engraved; a few by himself, and other
of 140 different engravers, French and foreign.

(L'Abbé de Fontenai, *Dictionnaire des Artiste*
Dictionnaire des Artistes, &c.; Watelet and Le
tionnaire des Arts, &c.; Fiorillo, *Geschichte d*
vol. iii.)

'LERS. There were two remarkable females often
in the literary history of the eighteenth century who
tle, and who are frequently confounded with each
ie one was the Marquise de Boufflers-Rémencourt,
ident of Voltaire, and the principal female ornament
t of Stanislaus Augustus of Poland. She was a great
l wrote some pleasing verses. The other was the
de Boufflers-Rouvrel, who is perhaps better known
ntry than her namesake, from having been a friend
ondent of David Hume. She was mistress of the
Conti, and on the death of her husband, in 1764,
ointed at not becoming the wife of that prince.
a tragedy in French prose. The ease and accurate
er English letters show that she was a very accom-
man.

)ER FORMATION, in Geology, a title now
to supplant that of diluvial deposits. *Till* is an
term employed in Scotland. By various writers
nulations are ranked in the ill-defined class of Pleis-
osits.

VE, VINCENT, was probably born three or four
e 1700, but the date of his birth does not appear
n recorded. He became a king's scholar in West-
hool in 1710, whence he was elected to be sent to
llege, Cambridge, in 1714; he took the degree
1717, and that of A.M. in 1721. He obtained a
at Trinity College, and was afterwards an usher in
er School, in which situation he seems to have con-
the rest of his life. He never took orders. He
nber 2, 1747.

Bourne is the author of a considerable number of
n poems, of several translations of short English
Latin, and of a few epitaphs in Latin and Eng-
is an exceedingly pleasing writer. He has great
and variety of thought, and great vividness of ima-
ften combined with a delicate humour quite peculiar
His subjects are generally occasional and of little
; but the treatment is very delightful, and entirely
lassical or any other commonplaces. His Latin is
pure; the expressions are chosen with exquisite
s versification has a facility and harmony not sur-
ny modern writer of Latin poetry.

Bourne's Latin translations are of poems admired
little valued now, such as Mallet's 'William and
Rowe's 'Colin's Complaint,' and Tickel's 'Lucy
' but the versions are of singular excellence, re-
ry trace of thought and expression which is really
nd improving, without appearing to change, the
ery and spiritless language of the originals: the
monotonous versification has also disappeared, and
have assumed a propriety and grace to which they
usly little claim. In poems of a higher poetical
such as Gay's beautiful ballad of 'Black-eyed
rne's mode of translation is very different, and is
d by a fidelity which, to those who know the diffi-
roximating two languages so dissimilar in structure,
s as it is admirable. But even here he gives an
eightening touch; for instance, in translating the
mile

> 'So the sweet lark, high pois'd in air,
>   Shuts close his pinions to his breast
> If chance his mate's shrill note he hear,
>   And drops at once into her nest,'

t only poises the lark, as Gay has done, but he
ibrating motion of the wings, so characteristic of
hen singing: he has also transposed the second
lines, in which Gay has obviously inverted the
er of thought for the sake of the rhymes:—

> 'Sic alto in caelo, tremulis se librat ut alis,
>   Si sociae accipiat forsan alauda sonos,
> Devolat extemplo, clausisque ad pectora pennis,
>   In carae nidum praecipitatur avis.'

has translated four of Bourne's Latin poems into
The Jackdaw,' 'The Parrot,' 'The Cricket,' and
v-worm,' in none of which, skilful as he was, has
l his original. Cowper speaks of Bourne in one of
As he was well acquainted with the man, and
ied to appreciate the value of his poetry, it is worth
ive the passage entire:—'I love the memory of
urne. I think him a better poet than Tibullus,
, Ausonius, or any of the writers in his way except
not at all inferior to him. I love him with a love
y because he was usher of the fifth form at West-
en I passed through it. He was so goodnatured and so indolent, that I lost more than I gained by him, for he made me as idle as himself. He was such a sloven as if he had trusted to his genius as a cloak for everything that could disgust you in his person; and indeed in his writings he has almost made amends for all. His humour is entirely original: he can speak of a magpie or a cat in terms so exquisitely appropriated to the character he draws, that one would suppose him animated by the spirit of the creature he describes. And with all his drollery there is a mixture of rational and even religious reflection at times, and always an air of pleasantry, good-nature, and humanity, that makes him, in my mind, one of the most amiable writers in the world. It is not common to meet with an author who can make you smile, and yet at nobody's expense; who is always entertaining, and yet always harmless; and who, though always elegant and classical to a degree not always found in the classics themselves, charms more by the simplicity and playfulness of his ideas than by the neatness and purity of his verse. Yet such was poor Vinny. I remember seeing the duke of Richmond set fire to his greasy locks, and box his ears to put it out again.'

The first edition of Bourne's 'Poematia' was in 1734, 8vo. To the third edition, in 1743, an appendix was added of other translations and poems, forming nearly one-half of the whole collection, 'Poematia, Latine partim reddita, partim scripta, à V. Bourne,' 12mo. There was another edition in 1750, 12mo. In 1772 a handsome volume in 4to. was published by subscription, 'Miscellaneous Poems, consisting of Originals and Translations, by Vincent Bourne, formerly of Trinity College, Cambridge, and Usher of Westminster School.' It contains a few additional poems, and two letters, one to a young lady, and another to his wife, written a short time before his death. 'Poetical Works, with his Letters,' 2 vols. 12mo., was published in 1808. We have not seen this edition. There has since been another edition in one vol. 12mo.

(Bourne, *Poematia*, 1743, 1772; Chalmers, *Biographical Dictionary*; *Critical Review*, 1772.)

BOVISTA, a genus of plants belonging to the natural order Fungi. This name was given it by Dillenius, and is a Latinised version of *Bofist*, its German name. In many parts of England its common name is Bull-fice, and some writers call it Bull puff-ball. The genus Bovista was at one time included under Lycoperdon [LYCOPERDON, P. C.], and the type of the genus, *Bovista gigantea*, was called by Linnæus *Lycoperdon Bovista*. The present Lycoperdon Bovista is the common or wolf puff-ball. The difference between the genera is, that Lycoperdon has a single peridium, while Bovista has a double one.

The *Bovista gigantea*, Bull Puff-ball, Frog's Cheese, and Bull-fice, is interesting on account of the enormous size it attains. It has the form of a flattened ball, at first of a perfectly white colour. Specimens have been gathered measuring as much as nine feet in circumference. When they have attained their full size, they begin to change colour; the external peridium cracks and peels off, the inner one also bursts at the apex. The interior is composed of a mass of tissue, which when young is white and moist, but at length becomes coloured and dry, and on being pressed emits a large quantity of powdery matter, which on being examined, is found to consist entirely of sporules. On examining the mass inside, it is found to consist of filaments which are mixed with sporules. Burnett says, 'It is probably the smoke that arises from these fungi when burned, or some of their allies the Lycoperdons, which forms the secret method advantageously employed by some persons who keep bees, in order to stupify the insects without killing them, while their hives are being robbed of all their honey.' Gerarde says, 'The common people use this fungus to kill or smoulder their bees.' He also says, 'In some parts, where the neighbours dwell far asunder, it is used to carry fire from place to place, whereof one species took the name of *Lucernarum fungus*.' It is used at the present day, in this country and on the Continent, as tinder, by the name of German tinder. The dried inside of this fungus was also at one time in great repute among surgeons as a styptic. A small pledget of it was always employed to cover the wound made in bleeding. It is now seldom used for that purpose. When this plant is young it is eatable. An Italian species, the *B. furfuracea*, which grows in great abundance on the heaths near Florence, is collected and sold in the markets, and, according to Micheli, is an esteemed article of food. Comparatively few however of the species of fungi are used as diet in this country.

(Bischoff, *Medicinisch-Pharmaceutische Botanik*; Burnett, *Outlines of Botany*.)

BOWDITCH, NATHANIEL. The materials for the life of Dr. Bowditch are contained in a very full and interesting account, written by his son, and prefixed to the fourth and posthumous volume of his translation of the 'Mécanique Céleste.' There are also before us 'Eulogy on Nathaniel Bowditch,' by John Pickering, Boston, 1838; 'Discourse on the Life and Character of the Hon. Nath. Bowditch,' &c., by Alexander Young, Boston, 1838; and 'Eulogy on the Life and Character of Nath. Bowditch,' by Daniel Appleton White, Salem, 1838.

Nathaniel Bowditch was born at Salem, in Massachussets, March 26, 1773. His family is traced to one of three brothers who emigrated from near Exeter at the beginning of the seventeenth century. His father was a poor working cooper, and could not give his son more school education than he could take up to the age of ten years. Perhaps this was no bad thing: for we are told that at the school to which young Bowditch was sent, it was the daily exercise of all the boys to spell the word *honorificabilitudinity*. At the above age he was taken by his father into the shop, and afterwards apprenticed to a ship-chandler. But a taste for arithmetic and mathematics developed itself early, and was cultivated, under many difficulties, with all the energy of his character, from which his mother had very early prophesied of him that he would be 'something decided.' In 1788 he was able to calculate an almanac for the year 1790. He learnt the elements of geometry and algebra by himself, and was taught navigation by an old British sailor. He taught himself Latin that he might read the 'Principia' of Newton, which he had done by the age of twenty-one. At different times of his life he also taught himself, in some cases with a little assistance, most of the European languages: his plan was to take the New Testament and a dictionary, and begin to translate, writing down the original; and in this way he is said to have left specimens of his attention to twenty-five languages or dialects. He is said also to have read through Chambers's Dictionary at an early age, without missing an article, and to have transcribed very largely from the Philosophical Transactions and other works which his poverty prevented him from buying.

He took to a sea-faring life in 1795, and made four long voyages as clerk or supercargo, and one as master. He was an excellent navigator, and on one occasion found his way into Salem harbour in a dark and snowy night, with no other guide than his own reckoning and one instantaneous glimpse of the light on Baker's Island. He taught every man on board his ship how to find a ship's place, and on one occasion had twelve seamen, being all his crew, every one of whom could take a lunar observation. He edited three editions of the celebrated work on navigation by John Hamilton Moore; but at last he had corrected so many errors, and made so many changes, that he thought himself justified in publishing it under his own name, as 'The new American Practical Navigator.' In this form it went through eight editions, and became very well known. His maritime life ended in 1804; in 1798 he married, but his wife died before the end of the year. In 1800 he married again; his second wife died in 1834, leaving a grown-up family. To the memory of this lady his translation of the 'Mécanique Céleste,' of which we shall presently speak, is dedicated.

In 1804 he was appointed to the presidency of the Essex Fire and Marine Company at Salem, a situation of emolument, which he held until 1823, when he accepted another and a still more lucrative appointment, the actuaryship of the Massachussets Hospital Life Assurance Company, at Boston. He died March 16, 1838, leaving behind him such a character, that, after making all allowance for filial and friendly partiality in the accounts above named, we must say they ought to have been published even though their subject had not attained any reputation of another kind.

Dr. Bowditch is the author of a good many papers in the Transactions of the American Academy, all on astronomical subjects: one in particular is on an extension of Napier's rules (vol. iii. pp. 33-38), by which they are applied (it is said; we have not seen the paper) to oblique-angled triangles. But the work which will carry his name down in Europe, and which entitles him to be considered as the first great promoter of mathematical analysis in the United States, is his translation of the 'Mécanique Céleste' of Laplace, with a commentary. Four volumes of this, answering to the first four volumes of the original, are completed and published, the last posthumously, Boston, 1829, 1832, 1834, 1839. The publication was substantially ready in 1817, but was deferred, among other reasons, by the expectation that Laplace himself would publish another edition. To the third volume is added
of appendix (Boston, 1834), containing the trans
lection of methods for computing the orbits of com
observations, with auxiliary tables. All this was do
Bowditch's sole expense, with the cheerful conse
family: the dedication above mentioned expressly st
the publication would not have been undertaken wi
wife's consent.

The commentary is very valuable, not only as g
reader of Laplace more recent views and simplified
bringing the results of a very great quantity of r
bear upon the text, but also as a real and effective
explanation of all the innumerable steps which La
omitted. Bowditch said, 'I never come across one of
"*Thus it plainly appears*" without feeling sure th
got hours of hard study before me to fill up the d
find out and show *how* it plainly appears.' We
ourselves asking a distinguished extender of Lapla
what were the existing helps to the reading of the 'M
Céleste,' and getting for answer 'A ream of paper a
hundred of quills.' There was no facilitating co
existence, except on detached portions; and Dr.
supplied this defect in a sound working manner.
to see that his explanations are for the most par
which he himself gained the point to which he is
ing to bring his reader. A mathematician, wh
more of his own fame than his reader's progress, w
disdained to publish the plain straight-forward
with which the notes are filled, the matter of whi
cisely such as a student of the most successful cla
to supply for himself. But this is the beauty of
comment, as a comment; and appears to us well
results of reading which appear in many of the
which, though by no means out of place, rather a
extend than explain. As a whole, and independ
author, this translation is a great undertaking; as t
a self-taught man, closely engaged in professional
is a wonder.

Dr. Bowditch bequeathed his library to the state
chussets, and it forms the commencement of a pub
named after him, at Boston.

BRACCIO FORTEBRACCI, called also B
DA MONTO'NE, from the name of his patrimo
was born at Perugia, A.D. 1368, of an old patrici
Braccio, before he was twenty, served as a Con
leader of a mercenary troop, in the service of th
Montefeltro against the Malatesti, Lords of Rimini.
when a general insurrection of the popular party
at Perugia, in which a number of the nobles were
the remainder driven away, the castle of Monto
a rallying-point for the exiles, and Braccio one of
est champions. After a desultory warfare betwee
factions for several years, the popular party applie
tection to Gian Galeazzo Visconti, the powerful
Milan, and paid allegiance to him in January, 1400
the death of Visconti, the party transferred its alle
Pope Boniface IX., under the plea of 'the welfare
public,' on condition that the emigrant nobles shou
in banishment. Braccio now resumed his life of
tiere, and served in Lombardy under the great leade
da Barbiano. He afterwards carried on a partisan
his own account, in the Marches of Ancona, ag
Marquis Ludovico Migliorati, the nephew of Pope
VII., when he levied contributions, plundered t
got ransoms from his prisoners. It was the custo
time to strip the common soldiers of their arms, h
accoutrements, and then set them free, but to d
officers or gentlemen, and make them pay ransom
to their respective means.

In 1406 the great Western schism began, which
extinguished twelve years after by the council of
during which period several popes or antipopes
the church by their conflicting claims. Ladislaus
Naples, thought of availing himself of this confusion
the Papal States and all central Italy, and he sent m
to Braccio in 1408, to induce him to enter his servic
ing to forward his views towards the subjection of
town, Perugia. Braccio accepted the proposal, recei
of money for his condotta, and crossing the Apenni
head of a considerable body of horse and foot, he s
valley of the Tiber and took several towns in the n
king. The people of Perugia, in alarm, sent amba
Ladislaus, who was then at Rome, and offered hi

eir city, provided he would not let the emigrants
lather than make peace with the nobles,' said the
e people in the council, 'we will submit to a
r.' Ladislaus accepted, in June, 1408, the do-
Perugia, with the 'merum et mixtum imperium.'
that the emigrant nobles should not be allowed to
in thirty miles of the gates of Perugia. He also
e body of Neapolitan cavalry to attack Braccio,
g received timely information, retired to the
om whence in 1409 he marched again towards
nd joined the other great Condottiere, Sforza
in driving away the troops of Ladislaus from the
e in the name of the new Pope, John XXIII.
in attacked Perugia, when Ladislaus, having made
Pope John, sent Sforza to check his movements,
moved towards Bologna in obedience to the
e Pope. In 1414 Ladislaus died, and was succeeded
r Joanna II., a weak princess. In the follow-
e council of Constance deposed John XXIII.
r intent upon his object of re-entering his native
ree, having exacted a sum of eighty thousand
the people of Bologna, marched with his bands
g of 1416, and encamped in front of Perugia, before
had time to prepare for defence. After some
e citizens in despair sent him a deputation, offering
Lord of Perugia, provided he granted a general
the past. On the 19th of July, 1416, Braccio
of his bands, and of all the emigrant nobles, after
years of exile, re-entered Perugia in triumph
mations, and received the oath of allegiance from
tes and the principal citizens. His conduct was
ut firm: he enjoined strict discipline on his
divided, at first, the civil offices among the two
y degrees he gave to his friends the larger share;
the importunities of the emigrants to recover pos-
eir confiscated property: he paid the debts of the
th his own treasures, accumulated during his
he encouraged the university of Perugia. The
n to like him, and the learned gave him their
he was cruel towards those who offered him
e.

Braccio marched towards Rome, which in the
legitimate pope was occupied by the Neapolitans.
it by capitulation, but he was shortly after obliged
t at the approach of his rival, Sforza. The council
had now elected Pope Martin V., a man of de-
who expressed his intention of recovering full
the Papal States, and ridding them of all lords and
deputation was sent to him from the council and
of Perugia, requesting him to confirm Braccio,
lontone, as Lord of Perugia. Martin gave an
er, upon which Braccio prepared for the threat-
by raising money from the neighbouring chief-
Marches and of Umbria, who paid his demands
. About this time Braccio issued a decree re-
e emigrant nobility of Perugia their property, of
ad been deprived since 1393.

tin allied himself with Queen Joanna of Naples,
im her General, Sforza Attendolo, to reduce the
ries into subjection. Braccio made preparation
m, but before the two rivals could meet in the
e quarrelled with Joanna, upon which both he
pported the claims of the Anjou dynasty to the
ples. One consequence of this change was that
d to make terms with Braccio, whom he invited
at Florence in February, 1420. Braccio went
ence with the retinue of a great potentate, and
by the Lords of Foligno, Camerino, Fabriano, and
y the principal nobles of Perugia, Assisi, Todi,
ni, and Rieti. On arriving at the gates of Flor-
k off his armour and put on a vest of purple and
ered the city on foot, escorted by the magistrates
ens of the republic, who accompanied him to the
e pontiff. It was agreed that Perugia and its
several towns in the Marches, should be adminis-
ccio and his heirs. Braccio was to serve with
the expense of the pope against Bologna, which
under one of the Bentivogli.

turn Braccio contributed to embellish Perugia,
red the construction of the emissary to carry
abundant waters of the Thrasymene lake. Bo-
course of two months was obliged to capitulate
s of Braccio, and submit to the pope in July, 1420. At the close of that year he married, with great pomp, the sister of Varani, lord of Camerino. Meantime a civil war broke out in the kingdom of Naples. Louis of Anjou, count of Provence, encouraged by Pope Martin, and supported by Sforza, who had quarrelled with Queen Joanna, invaded the kingdom, where he found numerous adherents among the nobles. Joanna sent Antonio Caraffa, nicknamed Malizia on account of his cunning, as her ambassador to Alfonso of Aragon and of Sicily, who was then in Sardinia. Alfonso went to Sicily to collect his fleet for the assistance of Joanna, who at the same time offered to Braccio the command of her land forces, with the rank of high-constable of the kingdom, and paid him down two hundred thousand ducats in advance. In the spring of 1421 Braccio entered the Abruzzo with a large force, surprising by the rapidity of his march the partisans of the Angevins, who submitted, except Count Caldora, who took refuge in the mountains. Sulmona capitulated. Braccio, issuing out of the defiles of Abruzzo, surprised Capua, and suddenly appeared before Naples, which was then besieged by Sforza and by the fleet of Louis of Anjou. King Alfonso meantime arrived with his fleet at the entrance of the bay; Sforza was obliged to raise the siege, the Angevins retired to Castellamare, and Braccio entered Naples in triumph with King Alfonso, who, together with Queen Joanna, solemnly bestowed upon Braccio the golden staff of high-constable of the kingdom, with supreme command over both the Neapolitan and Aragonese forces, and caused the troops to swear obedience to him. The queen at the same time created him Count of Foggia and Prince of Capua, the last of which towns she gave him in fief. A desultory predatory warfare was carried on for some time by the troops of Braccio against those of Sforza, in which however the poor inhabitants of the fine plains of Campania were the greatest sufferers. Pope Martin now interfered as mediator, and Louis of Anjou, giving up his attempt for the present, withdrew to Rome. Sforza remained under arms, but Braccio undertook to win him over to the queen's party; in which he succeeded at an interview near Monte Casino, when the two rival chiefs, who had both served in their youth under Alberico da Barbiano, renewed their former acquaintance. The war being now over, Braccio in the spring of 1422 returned to Perugia, after having taken on his way Città di Castello, which he added to his other territories.

In the following year, fresh disturbances having broken out at Naples, Alfonso sent again for Braccio, and Queen Joanna gave the messengers a crown to be placed on his head as Prince of Aquila and Capua, with full power to subdue and govern the important province of Abruzzo, which had again revolted. On the 13th of February, 1423, the Lord of Perugia, seated on a seat of ivory in the great hall of the townhouse, and attended by the lords of Foligno and Camerino, received the Neapolitan envoys, from whom Corrado Trinci, lord of Foligno, having received the crown, placed it on the brow of Braccio and a golden chain round his neck, amidst loud acclamations of 'Long live the Prince of Capua and Lord of Perugia.' As the dominion of Braccio extended over great part of Umbria and the Marches, and on the south over the principality of Capua, the acquisition of Aquila and the Abruzzo would have joined these two portions so as to form the whole into a compact principality. Braccio's ambition is said to have soared still higher, and to have aspired to the crown of Naples. In May, 1423, he gathered his bands near Todi, to the number of 3200 horsemen and some thousand foot, with which he entered the kingdom of Naples; he overran Campania and Apulia, defeated the partisans of the Angevins, took Bari, and advanced into Calabria; then retracing his steps towards the Abruzzo, he laid siege to the strong town of Aquila in the summer of 1423. He summoned the town in the name of Joanna and Alfonso, whose commission he bore. The authorities replied that they were lieges of their queen, and that as she was at that time in durance in consequence of the dissensions which had arisen between her and Alfonso, they would not open their gates to any armed party until harmony was restored in the capital and at the seat of government. Braccio then blockaded the town and devastated the surrounding country. Joanna, who had now revoked her adoption of Alfonso and made common cause with Louis of Anjou, ordered Sforza to march to the relief of Aquila. Braccio, being joined by other bands of the Aragonese party, was in possession of the whole Abruzzo. In December, 1423, Sforza began his march from Apulia along the coast of the Adriatic, took Ortona, and crossed the river Pescara near its mouth, his advanced guard making their horses swim through the stream.

As the body of Sforza's army remained on the opposite bank, Sforza plunged again into the river to encourage them to cross. One of his men, being carried away by the current, was in the act of drowning, when Sforza pushed his horse forwards to save him, seized him by the arm, and both sank into the water and disappeared. Thus died Sforza Attendolo, the great Condottiere, on the 4th of January, 1424. His army, disheartened, retired from the Abruzzo. Braccio, who was at Chieti, upon hearing the news, extolled the fame of his rival, remarking that this unexpected catastrophe boded no good to himself. He however pushed on the siege of Aquila with renewed vigour. The town began to suffer through famine. The archbishop encouraged the besieged by telling them that the queen and the pope would soon relieve them, and he excommunicated Braccio in the name of the pontiff. At last, in the spring of 1424, the Angevin army, led by Count Caldora and other chiefs, marched into the Abruzzo, and encamped on the hills above Aquila. Braccio drew out his troops in the plain below in order of battle. His officers entreated him to attack Caldora's soldiers as they came down the defiles of the mountain and before they could form, but he obstinately refused, saying that he wished to fight the whole force of the enemy and to decide the question at once. The battle was fought on the 2nd of June. Caldora's army was greatly superior in numbers, and in the midst of the fight a sortie from the people of Aquila, falling on the rear of Braccio's line, decided the victory. Braccio, while fighting desperately, received a blow on the head and fell senseless. He was taken prisoner to the camp of Caldora, and treated with humanity. He survived for three days, refusing to take food, though urged to do so, and would not utter a word. It was said that his wound was not mortal. He died on the 5th of June, 1424, in the fifty-sixth year of his age. Rome rejoiced at his fall; Ludovico Colonna took his body to Pope Martin, who ordered it to be buried in unconsecrated ground outside of the walls. Eight years after, Nicolò Fortebracci recovered from Pope Eugenius IV. the remains of his relative, and deposited them in the church of the Franciscan convent of Perugia. Oddo Fortebracci, son of Braccio, resigned the government of Perugia into the hands of the pope, in July, 1424, retaining the various fiefs of his father, with the title of Count of Montone. The history of Braccio's life forms an important part of the history of Italy during the fifteenth century, which was the last age of its tumultuous independence.

(Fabretti, *Biografie dei Capitani venturieri dell' Umbria*; Campanus, *De Vita et Gestis Brachii*; Lomonaco, *Vite dei famosi Capitani d'Italia*; Compagnoni, *Storia della Marca*; and the contemporary local chroniclers, among whom must be noticed Lorenzo Spirito, who wrote a poem of one hundred and one chapters in terza rima, entitled *L'Altro Marte*, in which he narrates in chronical order the deeds of Braccio and of his contemporary Piccinino. This curious poem was printed at Vicenza in 1489: it is now extremely rare.)

BRACHYPHY'LLUM, a genus of fossil plants, supposed to belong to the Coniferæ. One species, B. mammillare of Brongniart, occurs in the carbonaceous beds of the Bath oolite formation on the Yorkshire coast.

BRACHYPO'DIUM, a genus of grasses [GRAMINACEÆ, P. C.] belonging to the tribe Festucineæ of that order. It has unequal many-flowered glumes; the outer palea rounded on the back, setigerous at the summit, lateral nerves slightly converging, not vanishing upwards; the inner palea fringed on the ribs with rigid setæ; the styles terminal. Two of the species, *B. sylvaticum* and *B. pinnatum*, are British. This genus is distinguished from Triticum (wheat) by the unequal glumes alone.

(Babington, *Manual of British Botany*.)

BRADFORD CLAY, a thin bed of pale lead-coloured clay which lies upon the Bath oolite, especially at Bradford in Wiltshire, and contains, amongst other interesting fossils, the Pear Encrinite (Apiocrinus rotundus of Miller).

BRAKE, or BREAK, in Machinery, a contrivance for retarding or arresting motion, by creating an amount of friction too great for the moving power, or for the momentum of the machine, in cases where the moving power is suspended, to overcome. Brakes generally consist of blocks of wood so connected with a system of levers or screws that they may be pressed firmly against the periphery of a wheel mounted upon the main axle of the machine; but in some cases, instead of a block of wood, a strap or belt of iron, of sufficient length to embrace one-half of the periphery of the brake-wheel, or a
series of small blocks of wood attached to the conc
of such a strap, is used. The cuts given under S
P. C., p. 479, *Fig.* 4, and WIND-MILL, P. C., p.
cases in which brakes of this semicircular charac
ployed, although the brake-wheels only, and not
themselves, are represented. The brakes of railro
if small, as in the case of contractor's earth-wa
generally worked by levers, and often consist of
wood so mounted that, when the lever is depressed
equally upon the peripheries of two wheels, which
case, are very near together. The brakes of carri
run in the regular trains are usually worked by
which greater power may be gained, and they
capable of affording sufficient pressure to complete
revolution of the wheel, although it is desirable t
application of so strong a pressure, as, by causing
to be dragged along the rail, it impairs the rotund
tire. Brakes for locomotive engines have been c
be worked by steam; but they are not generall
being deemed better to confine the brakes to the
a few carriages in each train. With a view to p
dent by the continued motion of the hinder part
when the engine is stopped by an accident, self-ac
have been devised, which would begin to act as
buffers of two adjacent carriages were pressed to
would arrest the revolution of the wheels with a f
proportionate to the force with which the carriag
ther; but of these and many other schemes for the
of accidents, it is doubtful whether the inconveni
certain circumstances would not more than counte
anticipated advantages.

BRAMAH, JOSEPH, was born on the 13th (
or 2nd (Old Style) of April, 1749, at Stainboroug
shire, where his father followed the occupation
He was the eldest of five children, and was inte
father's avocation; but he very early exhibite
mechanical talent, and being, at the age of sixt
citated for agricultural labour by lameness, he
ticed to a carpenter and joiner. He subsequently
London, where he worked for some time as a
cabinet-maker, and afterwards set up in the same
himself. His adoption of the profession of engi
chinist appears to have arisen from his inventi
very important improvements in water-closets, in
of which he became a manufacturer of such ar
next important mechanical invention was the in
still known by his name, and which, after a la
years, during which time many new kinds of loc
introduced, maintains its character as one of the m
locks ever contrived. [LOCK, P. C. S.] This i
patented in 1784. Among the numerous other i
Bramah were improvements in water-cocks, pum
engines, and the hydraulic press, a machine
power, acting on the principle of the philosophic
the hydrostatic paradox. This invaluable machi
a representation and description is given under
P. C., p. 384, was patented in 1796. The bou
which it enables one man to exert renders it
agent in many manufacturing processes, one of
scribed under BANDANAS, P. C. S., p. 169. In
ing year he patented the elegant and convenient b
which is now so universally adopted in taverns
liquors in the bar from barrels deposited in th
means of a force-pump. He was also the author
ments in steam-engines, especially in boilers; i
for producing smooth and accurate surfaces on wo
in paper-making machinery; in making pens by a
process, by which several nibs, resembling stee
cut out of one quill, and fixed in a holder for use
construction of carriages. In 1806 he contrived
ingly ingenious mode of printing, which was s
wards applied to the numbering of bank-notes,
introduction of which, during the issue of one-pou
the Bank of England, the labour of 100 clerks out
dispensed with. This machine consists of a num
or wheels, with the numbers from 1 to 9, and 0,
periphery of each, the whole being mounted upo
but capable of turning independently of each oth
action of mechanism which is incapable of error,
of one wheel of the series is moved between each
printing, so that, when the machine is properly
will print a series of numbers in regular progress
the possibility of twice producing the same numbe

scheme for laying mains or large water-pipes
rincipal streets of London, of sufficient strength
great pressure, to be applied by force-pumps;
ing to provide the means of extinguishing fires
vater without the aid of a fire-engine, and also
fting power applicable to the raising of great
rcing water or air into an apparatus consisting
ubes, sliding into one another like the tubes of
id capable of being projected when necessary.
his ability to make a series of five hundred such
ive feet long, capable of sliding within each
eing extended in a few seconds, by the pressure
length of 2500 feet; and with such an apparatus
to raise wrecks, and regulate the descent of
e last patent obtained by Bramah was for a mode
dry-rot in timber, by covering it with a thin
's Roman cement. He died, in consequence of
d while superintending the uprooting of trees in
y his hydraulic press, on the 9th of December,
sixty-sixth year. In the construction of some
at Norwich. Bramah acted with success in the
f the civil engineer. He also appeared as an
Dissertation on the Construction of Locks,' and
the Right Honourable Sir James Eyre, Lord
of the Common Pleas, on the subject of the
and Watt versus Hornblower and Maberly,'
blished in 1797, and is referred to under Watt,
l. A memoir, which gives a very pleasing
amiable private character, and of his energy
business, was published in the 'New Monthly
April, 1814, from the pen of William Cullen
., and a biographical notice, chiefly derived from
nemoir, is given in Stuart's 'Anecdotes of Steam-
400-404.

I'S PRESS. [Hydraulics, P. C., p. 384.]

IO'STOMA, the name given by Costa to the
us of all living fishes, and indeed of all the

rdinary animal was first discovered on the coasts
ingle specimen having been sent to Pallas from
ornwall, during the latter part of the last cen-
reat naturalist of Russia described and figured it
ia Zoologica, under the name of *Limax lanceo-*
g it to be a mollusk, though remarking, in his
it, on the resemblance of some of its characters
fish. It seems to have been lost sight of for
f a century, and, with the exception of a brief
tewart's 'Elements of Natural History,' we find
t in any synopsis of animals. In 1834 it was
by Costa, on the Neapolitan shores, who de-
the 'Annuario Zoologico,' under the name of
a lubricum; and some years after, in his Fauna
m of Naples, gave a fuller account of it. Costa
that it was a fish, and not an invertebrate ani-
rked its affinity to the Cyclostomatous fishes.
Yarrell gave an account of it in his 'History of
,' under the name of the Lancelet, *Amphioxus*
He had not then met with Costa's account of it.
d described it from a specimen found by Mr.
erro in Cornwall, the first taken in that locality
nal discovery there. Mr. Yarrell gave the
tice of the chorda dorsalis and vertebral column.
ne time, singularly enough, considering how
aped notice since the days of Pallas, it was
l naturalists on the coasts of Sweden. Sunde-
found it in Bohuslan in 1834, but did not
t of it till 1841. Retzius had it from the same
blished a notice of it in the Berlin Proceed-
ber, 1839, in which also is a communication
bject by Professor J. Müller. Rathke gave an
structure in 1841. In the same year Mr.
lished an elaborate memoir on its anatomy in the
of the Royal Society of Edinburgh' for 1841,
lt of his examination of two examples taken in
by Professor E. Forbes, in 1837. In 1842 a
memoir on this animal was read before the
of Berlin, by Professor J. Müller, and this
ully illustrated, appeared in the volume of
f that Society published in 1844.
instances of its capture above mentioned, it
ntly taken by Mr. MacAndrew, on the west
and, and by Professor Edward Forbes, in the

The great interest which attaches to this fish depends on the strangeness of its anatomical characters, the unexampled degradation of its organization among the Vertebrata, and the link which it forms between the highest of animals and some of the lowest. A vertebrated animal without a brain, a fish with the respiratory system of a mollusk, and the circulatory system almost of an Annelide, presents a combination of characters which must excite the wonder and interest equally of the physiologist and the systematic naturalist. Scarcely any animal yet discovered is so likely to change received views of classification and relative order of characters as the Lancelet. As yet however it has attracted but little attention among zoologists, though the physiologists and anatomists have fully perceived its value. For these reasons we shall give a full account of what is now known respecting its external character, structure, and habits.

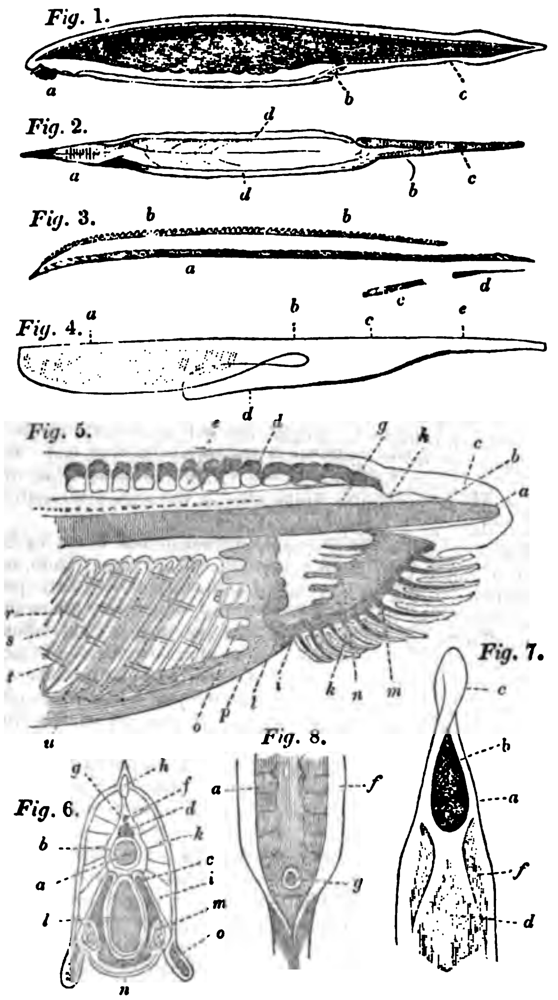
Description.—The usual size of the Lancelet is about two inches in length. The height to the length being as 1 : 10, and the breadth to the length as ¼ : 10. It is of a lanceolate form, tapering to each extremity, and riband-like. Anteriorly it terminates in a head scarcely distinguishable from the body, apparently pointed, but when examined closely seems to end in a rounded and somewhat spathulate rostrum, beneath which is the mouth, a *longitudinal* opening, fringed on each side by a row of long filaments, which can close in and clasp alternately, so as to protect the oral opening. Along the back runs a continuous fin, which dilates near the sharp posterior extremity on each side, so as to form a sort of caudal fin. Near the tail opens the vent, in front of which is a median fin continued to another opening, situated a little behind the centre of the body (*porus abdominalis*) and serving as an outlet for the genital products. Continued from this forwards nearly to the mouth, are two strong lateral folds, mistaken by Pallas for the margins of a ventral disk, and hence leading him to consider the animal a Gasteropodous Mollusk. The entire animal is translucent and of a silvery whiteness, its sides being marked by the indications of the lateral ichthyic muscles, which give it the aspect of a small sand-eel.

Organization. Skeleton.—The osseous system consists of a *chorda dorsalis* tapering at both ends, and, strange to say, not presenting the slightest vestige of a cranium, and of the germs of superior and inferior inter-spinous bones and fin-rays in the most rudimentary state. The *chorda dorsalis* is composed of from sixty to seventy vertebræ, which are also in a rudimentary state and little more than indicated. The 'chorda dorsalis,' to quote Mr. Goodsir, 'is formed externally of a fibrous sheath, and internally of an immense number of laminæ, each of the size and shape of a section of the column at the place where it is situated. When any portion of the column is removed, these plates may be pushed out from the tubular sheath, like a pile of coins. They have no great adhesion to one another, are of the consistence of parchment, and appear like flattened bladders, as if formed of two tough fibrous membranes pressed together.' Besides the skeleton of the nervous system, there is a hyoid apparatus, forming the armature of the mouth, and consisting of two sets of 17 articulated pieces, from each of which, except 2, a ray proceeds. These rays form the oral cirrhi. Müller takes a different view of this structure, maintaining that it corresponds neither to the jaw-bone nor to the hyoid apparatus in other animals, but is analogous to the cartilaginous ring of the mouth of the lamprey and the Myxinoid fishes, a system peculiar to that family. There is also in the lancelet a series of fine, transparent, cartilaginous hair-like ribs, seventy to eighty on each side, forming a cage for the protection of the branchial cavity.

Nervous system.—The spinal cord extends the whole length of the spine, but is not quite so sharp at the fore-end as behind. It presents no trace of a brain. From 55 to 60 nerves pass off from each side of it, which do not arise by double roots. The details of this important part of the animal's anatomy are fully given by Mr. Goodsir. Müller and Rathke have observed the existence of rudimentary eyes, consisting of a small black spot of pigment, but not furnished with any optical apparatus. No traces of organs of smelling or hearing have been met with.

Vascular system.—The observations of Müller having been made on the living animal, he was enabled to pursue this part of its organization further than the other observers. According to him, the vascular system of this animal corresponds in general arrangement with that of fishes, differing however in regard to the heart from that of all other vertebrate animals, and displaying a striking accordance with that in worms, for the hearts in the Branchiostoma are not only more divided than in other animals of its class, but present entirely the form and distribution of blood-vessels, and extend over wide spaces. The blood is white!

The *Respiratory system* is constituted by the anterior extremity of the intestinal tube, the walls of which are clothed with vibratile cilia, and protected and adapted to their office by the peculiar cage-like skeleton already mentioned, which is further strengthened by transverse cartilaginous rods, between which are numerous clefts, their openings protected by vibratile cilia. This was first made known by Müller, who described also a curious apparatus of finger-shaped wheel-organs and fringed folds placed at the entrance of the branchial cavity, and marking the commencement of the ciliated portion of the intestinal canal, of which the branchial
At the end of the branchial sac is the *porus*
opening which serves equally respiratory a
poses.



Explanation of the figures:—

Fig. 1, The Lancelet, a little larger than life. *a*, the mouth; *b*, *porus abdominalis*; *c*, the vent.

Fig. 2, View of the animal from beneath. *a*, the mouth; *b*, *porus abdominalis*; *c*, vent; *d*, *d*, ventral folds.

Fig. 3, The neuro-skeleton of the Lancelet, consisting of—*a*, the *chorda dorsalis*; *b*, *b*, the vesicular germs of the dorsal fin-rays; *c*, those of the anterior, and *d*, those of the posterior anal fins (from Goodsir).

Fig. 4, The intestinal system. *a*, the branchial sac: *b*, the œsophagus: *c*, greener and wider part of the intestinal canal; *d*, *cæcum*; *e*, narrower and posterior part of the intestinal canal.

Fig. 5, Anterior extremity of the body of a young animal (from Müller); the lateral muscles are omitted in order to show more clearly the other parts: *a*, *chorda dorsalis*; *b*, its sheath; *c*, rounded anterior extremity of the body, terminating in the dorsal fin; *d*, cellular dorsal fin-rays; and *e*, their contents: *g*, spinal marrow; *h*, eye; *i*, labial cartilages; *k*, cirrhi of the mouth; *l*, a muscle of the labial cartilages, arising from the fringed fold between the cavity of the mouth and branchial cavity: *m*, wall of the mouth; *n*, finger-formed figures on the wall of the mouth (ciliated organs); *o*, fringed fold between the oral and branchial cavities; *p*, heart like arch of the aorta, connecting arch between the branchial heart and aorta; *q*, anterior and superior part of the branchial sac, in which the branchial slits are wanting; *r* and *s*, branchial ribs; *t*, branchial slits; *u*, walls of the belly.

Fig. 6, Transverse section of the body (from Müller): *a*, *chorda dorsalis*; *b*, its sheath; *c*, membranous layer; *d* spinal marrow, and *f*, canal above it; *g* and *h*, section of fin-rays: *i*, lateral muscles; *k*, intermuscular ligament; *l*, branchial sac; *m*, ovaria; *n*, wall of belly; *o*, lateral ventral folds, with their canal.

Fig. 7, View of the anterior part of the body from beneath: *a*, mouth; *b*, cirrhi; *c*, snout; *d*, ventral wall; *f*, lateral ventral fold.

Fig. 8, View of the underside of the body in the region of the *porus abdominalis*: *a*, ovary, *f*, lateral ventral folds; *g*, *porus abdominalis*.

The *Digestive system* consists of an intesti
cœcum, both of which are ciliated. The latt
by Müller to be a liver, but the office of liv
performed equally by the other parts of the in

The *Reproductive system* is imperfectly l
as it has been observed, it appears in the
bean-shaped bodies attached to the inner surf
of the abdomen, on the outside of the b
Müller distinguishes the two sexes, but this p
of the Lancelet demands further investigatio
possible that the two membraneous folds of t
their canals may be connected with this s
marsupial purposes. This we throw out as a

The *Muscular system* is highly symmetrical
a series of lateral muscular bundles correspon
size, and position to the vertebræ of the *cho*
bearing a general resemblance to the lateral
higher fishes. Müller classes the muscles
under the heads of, 1st, lateral muscles:
muscles; 3rd, muscles of the oral ring and
muscles of the ring between the oral cavity a
and, 5th, muscles of the branchial apparatu
thin, tough, and scaleless.

Habits.—The Lancelet lives in sandy grou
between ten and twenty fathoms water. It
itself in the sand. When taken, it swims
snake-like motion, but after a time settles d
turbed, lying flat on its side. It is very t
We have had it for three hours in a watch
microscope, at the end of which time, wh
seemed as lively as at first. It dislikes the
handling without injury. Its food was fou
the intestinal canal of some of the specimen
it consisted of infusorial animalculæ. The L
swallow but simply imbibes its food.

General Remarks.—'*Branchiostoma*,' s
evidently a vertebrated animal and a fish. It
from all other Vertebrata by its peculiar ci
and by the absence of a distinction betwee
spinal marrow; from all other fishes by t
number of branchial ribs, by the union o
and ventral cavities, and by the combina
spiratory opening with the ventral opening
siders it connected with the Cyclostomatou
the peculiar characters of its chorda do
absence of jaws, but as inferior to them in t
distinct brain, and in the peculiarities of
system. 'The *Branchiostoma*,' he conclud
the Cyclostomatous fishes, but not among the
from them by *distinctions which are greater*
ences between fishes and naked amphibia!'

'Viewed as an entire animal,' writes Mr
Lancelet is the most aberrant in the vertebra
It connects the Vertebrata not only to the A
but also, through the medium of certain symm
(the genus *Pelonaia* of Forbes and Goodsir) t
We have only to suppose the Lancelet to have
from the dorsal aspect, the seat of its respira
ferred from its intestinal tube to a correspon
its skin, and ganglia to be developed at the p
of one or more of its anterior spinal nerves, an
of its second pair, to have a true Annulose ani
culiar circulation, respiration, generative orga
system, with supra-œsophageal ganglia and d
recurrent nerve.'

Taking all we know of the structure of this
animal into consideration, we are inclined
the relic of some great order of fishes, which
ization brought down the vertebrated series t
the *lower* forms of Mollusca, and which be
some former epoch of the world's geological h
the unpreservable character of their bodies,
of hard parts, left 'not a wreck behind.' Th
of nature, the more are we convinced that the
organisms; that beings apparently anomalous
orders either partially known or for the mo
Of all anomalous creatures the *Branchiostom*
and it is much more consistent with the princi
zoology to admit it as the type of a distin

attempt to place it among defined groups. The
ination of characters which it presents—a verte-
l without a brain, having the respiratory appa-
scidian Mollusk, and a ciliated intestinal cavity—
ıost warrant its erection into the type of a class by
ly is sufficient and more than sufficient to con-
type of an order in the lowest of the vertebrate

S. MONUMENTAL. By 'a brass,' as the term
used, is meant a plate of brass, which has been
a stone slab, and fastened down by being laid in
and riveted through the stone. The effigy of
eased is usually engraved on the brass plate; there
a canopy over the head, and there are often ar-
ıgs, angels, saints, and other ornaments, together
tions, sometimes on labels, sometimes round the
e slab, but mostly below the feet of the effigy.
ate parts have been, in almost all cases, engraved
plates, each of which is inlaid in its own cavity

The engraved plates were not originally in the
in which they now appear, but were generally
ıd sometimes gilt, and the incised parts were filled
r coloured resinous substances. The plates were
ith the surface of the stone, which was generally
our, and thus became an appropriate background,
ıctness and relief to the engraved brasses, and
ıe beauty of the figures and ornaments. Slabs
are commonly laid in the pavement of churches
but are sometimes on table-tombs. As the art
rass was not introduced into England till 1639,
e all of foreign manufacture, of the hard kind of
ly called latten.

f engraving the plates was probably brought to
n Flanders and France, as well as the plates them-
brasses still exist in this country which are
ave been engraved by Flemish artists, and there
e brasses still remaining in the churches of Flan-
of France were nearly all destroyed during the
when they were converted into coin or cannon.

ssible to determine when monumental brasses
troduced into England, most of the oldest speci-
doubtless been destroyed, but it was probably
part of the reign of Henry III. Brasses with
ly as about 1240 are known to have been de-
obably one of the earliest now remaining in Eng-
f Sir Roger de Trumpington, at Trumpington, in
f Cambridge, who died in 1289. During the
entury monumental brasses became more and
us: in the fifteenth century they were in still
lance; but towards the close of the sixteenth the
n to diminish, and in the reign of James I. the
had almost ceased. One of the latest specimens
ıe brass of Harsnett, archbishop of York, who
: it is at Chigwell, in Essex. The number of
now remain in England, though still consider-
small compared with what it has been. Many
ed when the monasteries were suppressed in the
ry VIII.; many have been torn up, and sold as
ut the greatest destruction of them took place
edominance of the Puritans, who regarded them
ıs.

on a monumental brass is generally repre-
bent on the back, with the hands on the breast
o palm, in the attitude of prayer; and this form
y to men and women; but occasionally the figure
standing or kneeling. The head usually rests
which is sometimes supported by an angel on
Iilitary noblemen are generally in full armour;
ın the vestments peculiar to their orders; ladies
tly a small dog lying at the feet. The canopies
ngraved architectural embellishments are fre-
mely elegant. The canopy is sometimes a pedi-
innacles and finial; sometimes a foliated arch;
s a foliated arch below a pediment; the canopy
isolated, and sometimes rests on slender pillars.
armorial bearings are placed on the pillars and
which a specimen is shown in the article TOMB,
beautiful brass of Eleanor de Bohun, in West-
ey, wife of Thomas of Woodstock, duke of Glou-
f Edward III. The shields of arms, devices,
ities of costume, appropriate each brass to its
markable manner. Each period has also a form
character almost peculiar to itself, which, in the early brasses, is adhered to with singular uniformity. Some inscriptions in the Gothic letters are very handsome. Roman letters are rarely used before the reign of Henry VIII., and are generally inelegant enough. The Gothic forms continued to be used occasionally till a late period. Most of the early inscriptions are in Latin. French inscriptions occur generally from 1350 to 1400. English inscriptions afterwards became more common, but Latin still continued to be frequently used.

Monumental brasses in England have been most abundant in the eastern counties, partly perhaps in consequence of the contiguity of those counties to the Continent, whence the use of brasses seems to have been introduced, and partly of the want of stone suitable for the effigy in relief, for which the brasses appear to have been substituted. In Wales and the north of England brasses are comparatively rare. None have been found in Scotland; and only two in Ireland, which are of late date, in Dublin cathedral.

Specimens of monumental brasses are easily obtained by the process called *rubbing*. Paper of moderate thickness, tenacity, and softness, is laid upon the brass, and rubbed with a black or coloured material, which adheres to the paper where the brass is solid, leaving it in its original state where there are incisions, which of course offer no resistance to the rubber. With a little care a perfect fac-simile may be obtained. Shoemakers' heel-ball, which is a composition of tallow, wax, and lamp-black, has hitherto been found most convenient as a rubber; the operation is clean and easy. Paper of suitable quality and of the full size of a whole slab is manufactured on purpose, as well as suitable heel-balls.

Another material for making rubbings has recently been invented, which is composed of a yellow metallic powder mixed with the adhesive substance of which the rubber is composed, as the lamp-black is mixed with the tallow and wax. When the rubbing is made on a dark-coloured paper, a fac-simile is obtained not easily distinguishable from the original: the figure appears to be the brass itself, and the paper which remains unacted on by the rubber seems to be the stone slab in which the brass is imbedded.

The first collection of copies of brasses was made by Sir John Cullum, Craven Ord, and the Rev. Thomas Cole, not by rubbing in the manner just described, but by a rude process resembling copper-plate printing, which was afterwards worked over by the pen, and cost much time and labour. The collection was sold for 43*l.* to the late Francis Douce, and was bequeathed by him to the British Museum, where it is now in the print-room. In 1840 the first number was published of 'A Series of Monumental Brasses, extending from the reign of Edward I. to that of Elizabeth; by J. G. and L. A. B. Walker.' Parts I. to XV. have been published. The selection of specimens is very judicious, the plates are exceedingly accurate, and the work is accompanied by explanatory letter-press.

(This article has been abridged, with a few alterations and additions, from the *Penny Magazine*, Nos. 812 and 813.)

BRAY, SIR REGINALD, the reputed architect of Henry the Seventh's Chapel at Westminster, was the second son of Sir Richard Bray, one of the privy council to Henry VI. All that has been ascertained of his personal history is that he was greatly attached to the study of architecture, and stood in high favour with Henry VII.: therefore that he should be employed by that king to design the sumptuous structure intended for his own mausoleum was almost matter of course. Nevertheless, Bray's claim to the honour of so fine a work has been disputed, on no better grounds than that he did not live to see the building greatly advanced, the first stone being laid on the 18th of January, 1502 ('by the hands of John Islip, abbot of Westminster, Sir Reginald Braie, Kt. of the Garter, and others'), and he dying on the 5th of August in the following year. While his death within a year and a half afterwards proves nothing more than that he did not live to see his designs for the edifice fully realised, the fact of his assisting with the abbot in the ceremony of laying the first stone amounts to conclusive proof that he was the architect or designer of the fabric, it being the most unlikely thing imaginable that he would have taken an active share in such a ceremony had the building been the work of a rival artist. Besides, that Bray possessed talents equal to the occasion is beyond all doubt, it being admitted even by those who would reduce his fame, that he erected the nave of that other singularly beautiful structure, St. George's Chapel at Windsor, commenced by Edward IV. Sir Reginald's arms, crest, and device, R. B., and a hemp-break, occur in many places on the ceiling of that building, and in the south aisle there is a chapel still called after him, in which he was buried.

BREAD, BEER, AND ALE, ASSIZE OF. [ASSIZE, P. C.]

BREAKWATER. [PLYMOUTH, P. C.]

BREAST WHEEL. [HYDRAULICS, P. C., p. 384.]

BRECCIA. [OSSIFEROUS BRECCIA AND CAVERNS, P. C. S.]

BREVIA'RIUM ALARICIA'NUM is now the usual name of the code which was compiled at the command of Alaric II., king of the Visigoths, from the Roman law and the Roman jurists. It was completed A.D. 506, in the twenty-second year of his reign. The code was confirmed by the nobles and bishops, and signed by Anianus, the referendarius of Alaric, a circumstance from which the erroneous inference has sometimes been made that he was the compiler of it. The title Breviarium Alaricianum was only introduced in the sixteenth century: it was sometimes called Lex Romana, and sometimes Lex Theodosii, in respect of the most important part of its contents.

The contents of the Breviarium are formed of abbreviations or compilations from the following sources:—1, Codex Theodosianus, 16 books; 2, Novellae of Theodosius II., Valentinianus III., Marcian, Majorian, Severus; 3, The Institutions of Gaius; 4, The Receptae Sententiae of Paulus; 5, Codex Gregorianus; 6, Codex Hermogenianus; 7, Papinianus, lib. I. Responsorum. Accordingly the code was composed of Imperial Constitutions, or Leges, as they are properly termed in the Breviarium, and of the writings of Roman jurists, which in the Breviarium are termed Jus.

This Code is of some value for the history of the Roman law, as it contains extracts from portions of the Roman law which are wholly or partially lost, as the work of Paulus, and from the first five books of the Theodosian Code, which however, owing to recent discoveries, are less imperfect than they were. The discovery of the Institutions of Gaius [GAIUS, P. C.] has rendered that part of the Breviarium in which Gaius was epitomized of little value. The lacunae in Gaius cannot be filled up from the Epitome, because the compiler paid little attention to retaining the words of the original, but the Epitome shows what matters were discussed in those parts of Gaius where the MS. is defective. The whole of the Breviarium is contained the 'Jus Civile Antejustinianeum,' Berlin, 1815.

BREXIA'CEÆ, a natural order of plants belonging to Lindley's polycarpous group of monopetalous Exogens. This order contains at present but one genus, and was constituted by Lindley in the first edition of his 'Natural System of Plants.' The following is his description of the order:—Calyx inferior, small, persistent, 5-parted, æstivation imbricated; petals 5, hypogynous, imbricated in æstivation; stamens 5, hypogynous, alternate with the petals, arising from a narrow cup, which is toothed between each stamen; anthers oval, innate, 2-celled, bursting longitudinally, fleshy at the apex; pollen triangular, cohering by means of fine threads; ovary superior, 5-celled, with numerous ovules attached in two rows to placentæ in the axis; style 1, continuous; stigma simple; fruit drupaceous, 5-celled, many seeded; seeds indefinite, attached to the axis with a double integument, the inner of which is membranous; no albumen; cotyledons ovate, obtuse; radicle cylindrical, centripetal. The species are trees with nearly single trunks; the leaves are coriaceous, alternate, simple, not dotted, with deciduous minute stipules; the flowers are green in axillary umbels, surrounded by bracts on the outside.

Dr. Lindley remarks that the habit of Brexia is that of some Myrsinaceæ, especially of Theophrasta, from which it differs in being polypetalous and the stamens being alternate with the petals. Its relations are also strong with Rhamnaceæ and Celastraceæ, but its stamens are hypogynous, and its seeds indefinite. Some resemblance to Anacardiaceæ may be seen in the resinous appearance of the young shoots and in its habit. It agrees with Pittosporaceæ in its hypogynous definite stamens, its polyspermous fruit, and alternate undivided leaves. There are three species of Brexia, all of them elegant trees with a fine foliage. They grow well in a mixture of turfy loom and peat, and cuttings with their leaves not shortened strike readily in sand under a hand-glass in heat, or a leaf with a bud attached will grow. The leaves are covered with a resinous matter which causes rain to run off them immediately, and thus induced Noronha to give these plants the name of Brexia, from Brexis (Βρέξις), which signifies 'a wetting.' In gardens they are commonly called Theophrastas, but they differ considerably from that genus. All the species are natives of Madagascar.

(Loudon, *Encyclopædia of Plants*; Lindle
System, 2nd edit.; Don, *Gardener's Dictionary*.

BRIBERY. [ELECTION COMMITTEES, P. C.

BRICK-MAKING BY MACHINERY.
last few years great improvements have been ma
making, mainly by the substitution of machiner
labour in many of the processes. It has been fo
of the brickwork of railway arches and tunnels th
or most exposed bricks have a tendency to dec
alternations of temperature and moisture to wh
subjected; and it is as a means of lessening that t
increasing the solidity and closeness in the adh
clay of which the bricks are formed, that machine
have often been recommended.

About 1836 Messrs. Heaton of Birmingham
before introduced a mode of tempering the b
rolling, devised a machine for moulding the brick
preparing the clay. The machine consisted of
wheel, round the margin of which were arranged
brass moulds, the proper size and shape for b
bottom of each mould was loose and moveable ve
small apparatus beneath, connected with a little w
wheels of all the moulds worked on a circular rail
such an inclination as to leave the bottom of the
proper position when at one part of the circula
lifting it up to the top of the mould when the b
velled round half a circle. When any of the moul
particular part of the circuit, a loose board was p
an attendant, a stream of water was forced into it fr
pump, and the tempered clay, coming from the rol
which it had been pressed, and passing through a
forced by a plunger into the mould; then, the
vancing one step in its circuit, a knife-edge slice
superfluous clay, and rendered the upper surface s
mould continued to travel on in its circular p
bottom, with the newly-made brick, became h
dually; until, by the time the half-circuit had bee
brick was lifted wholly out of the mould: a man
the brick, and prepared it for burning in the u
It was a necessary feature in this arrangement,
moulds were in different states or stages at any on
time; half of them contained bricks, half cont
one was just receiving its supply of clay, while ano
opposite, was yielding a finished brick to the
workman; and of the rest, some were having th
toms slowly raised to elevate the bricks resting on
others were gradually resuming the form fitted
ception of clay.

In 1838 M. Terrason introduced a mode of ma
differing considerably from the above. There are
of the apparatus, destined respectively to kneadin
moulding the bricks, and transporting them when
yard or depository. In the first process, two hors
to the two arms of a lever, turn a large wheel con
a trundle, which impels a vertical shaft working in
the shaft being furnished with spiral cutters. Th
clay being put into the cylinder, the cutters by th
knead it, divide it, and work it up most completely
arrives at the bottom of the cylinder in a unifor
then passes out at a hole in the lower part of the c
continuous rod or fillet. The second machine,
mould the bricks, is placed near the former one, a
the fillet of clay as it exudes from the cylinder.
for the bricks is simply an oblong channel or ho
having neither cover nor bottom, but one roll
above it and another below it. The clay enters t
the width and height of which give the prope
thickness of a brick; while the two rollers, pressi
above and below as it enters, give the proper flatn
to the upper and lower surfaces, compress the clay
consistency, and expel the superfluous portions.
fact, passes through a kind of rolling-press. When
trough has been removed, by reciprocating action
by machinery, from this press, the board on whic
rests becomes released from the side-boards of the t
on passing under a particular part of the apparatus,
fillet of clay is cut into ten or twelve bricks, by th
as many wires stretched across above them. By
long row of cylinders, working on an inclined plan
of bricks is carried to any convenient distance, wh
deposited previous to burning.

In the same year another machine was invent
Jones, in which the clay, being mixed with a less

er than usual, was kneaded in a ‘pug-mill’ to a stiffer con-
nce than ordinary, thereby rendering a shorter period for
ng sufficient. The rate at which the bricks were made
his machine was stated to be from one to two thousand
hour.

he Marquis of Tweeddale's invention, which bears a con-
rable resemblance in principle to that of M. Terrason,
e out of a wish on the part of that nobleman to aid in
rding improvements in the draining of land for agricul-
l purposes. It has been ascertained that the best mode of
oving the surplus water from land is by means of drains or
its formed of tiles, and laid beneath the surface of the
nd; and it was with the hope of enabling these tiles to
ade quickly and cheaply that the machine in question
invented. A very few words will suffice to explain in
degree this machine differs from that of M. Terrason.
clay, in the first place, is forced between two rollers
half an inch apart, so as to crush any stones contained
and is then worked up to the proper consistence in a
ing cylinder. The clay passes between two cylinders,
give it the proper thickness for a tile, while two side
give the requisite width: it traverses an endless apron
carries it to a piece of apparatus where the long slid
y is bent to the requisite concave form, and where a
nding wire cuts off, by separate movements and at suc-
e instants, pieces of the proper length for tiles. The
of the machine is continuous; for the long ribbon of
is formed at one end as fast as it is cut off at the other,
by modifying the adjustments of the apparatus, the pieces
off may have the proper form for draining-tiles, house-
flat roofing-tiles, or bricks. One man and two boys,
the aid of this machine, can make in one day ten
d drain-tiles, or twelve thousand roofing-tiles, or
y thousand flat tiles for the draining-tiles to lie upon;
he tiles so made are said to be stronger, more impervious
ter, and smoother than those made by hand.

m about the year 1840 to 1842 the suggested or
ted improvements in brick-making were very numerous;
hey do not call for lengthened description. In Mr.
b's method there is a sliding-frame beneath the bottom
mill, in which the clay is ground; and this frame con-
two brick-moulds, so arranged that while one of them is
an opening in the bottom of the mill, receiving clay
thence, the other is outside the mill delivering a moulded
; the two moulds being alternately placed in communi-
with the mill. The bottom of each mould consists of
veable bed, which, when the mould has arrived outside
mill by the movement of the frame, forces the brick up
of the mould, to be removed by an attendant. Another
od introduced about the same time is nearly on the prin-
of the Marquis of Tweeddale's, but differs from it in the
whereby a screw forces the clay out of the mould, and
the way in which the wires descend to cut it into bricks.
hod patented by Messrs. Cook and Cunningham is on
rent principle. Here a sliding mould-frame, contain-
o moulds, is applied to the side of the mill in which
clay is prepared. The clay is forced, by the rotation of
within the mill, through an opening into a box; and a
working in this box presses the clay into one of the
ds in the sliding frame. When one of the moulds has
thus filled, the frame moves forward, which brings
ther mould under the box, while the first mould is car-
over an empty moveable mould placed on a table; a
presses the brick into the empty mould, and the
d thus set free returns to receive a fresh supply from
box. The mode is thus so far a continuous one—
while one mould is emptying its contents into the move-
one, the other is receiving a fresh supply at the box;
e a boy receives the moulded bricks from the moveable
ld as fast as they are deposited in it. Mr. White's
nt, of the same year, related principally to an improve-
in the mode of supplying the clay from the mill, in the
eddale machine.

Mr. Gibbs has proposed a method in which both the ma-
ls of the bricks and the mode of manufacture are taken
account. He proposes to use Merstham sand or pul-
ed Merstham sandstone, combined with London clay or
e-clay; in proportions varying according as bricks, tiles,
pottery are the object of manufacture. The mode of
ing bricks under the patent embraces two or three modi-
tions, of which one consists in rolling the clay out into a
et of uniform thickness, then cutting it by machine-worked
es or wires into brick-shaped pieces, and compressing these by a separate machine. An American method introduced more recently by Messrs. Beach and Lukens, seems to be founded mainly on the plan of Messrs. Heaton, but to contain a provision for transporting the bricks to any convenient spot by means of an endless belt.

Mr. Prosser has introduced a method of making bricks, tiles, and small articles of earthenware, from earth or clay almost in a state of dryness. This subject is noticed in connection with some of the recent inventions relating to Mosaic Pavements. [P. C. S.]

A communication was made to the ‘Surveyor, Engineer, and Architect,’ a year or two ago, concerning the use of *floating* bricks. The Romans were acquainted with the use of bricks which would float in water; and M. Fabbroni, in 1790, discovered a kind of earth which he thought to be fitted for this purpose. It occurred near Castel del Prano in Sicily; and the earth consisted of silica, clay, magnesia, lime, iron, and water. Bricks made from it floated in water, conducted heat with extreme slowness, and could not be fused in an ordinary fire. It is proposed in the paper just alluded to, that bricks so formed would present many advantages on ship-board, in all erections connected with furnaces and fire-places; and also that a novel kind of ornamental pavilions or houses might be formed on lakes in pleasure-grounds; the base being a platform of durable wood, and the superstructure of these buoyant bricks. The *weight* of the bricks, made by any method, is an important matter in relation to the purpose for which they are to be applied. In a conversation at the Institute of Civil Engineers, after the reading of a paper relating to bricks, several engineers objected to the use of bricks made wholly by machinery, on the ground that their extreme compactness made them heavier and more costly than common bricks, and delayed their drying. Mr. Hunt has, for this reason, brought into use a contrivance something like that of the Marquis of Tweeddale, but where hand-power and slight pressure are substituted for machine-power and heavy pressure. The decision as to the general introduction or not of machine-made bricks, will probably depend, as in most other cases, on the relative expense in comparison with the hand method; hitherto they have been rather too costly.

BRIDGES are of two classes, public and private. Public bridges may be considered either as county bridges or as highways, although the principle of that distinction does not seem very clear. Every county bridge is a highway, inasmuch as it is a bridge over which a highway passes; it is therefore in that respect strictly a highway: so also is every other public bridge over which a highway passes. The usual distinction drawn between them is derived from the nature of the space over which the bridge gives a passage. A county bridge, or, in other words, a bridge which the county is bound to repair, is usually defined to be ‘a common and public building over a river or water flowing in a channel more or less definite; whether such river or channel is occasionally dry or not.’ This is evidently a very loose definition, for it does not prescribe the width of the river or the nature of its channel; but it seems clear that a county bridge must pass over a water, as the county would certainly not be bound to repair a bridge erected across a ravine, or over an antient road crossed by a new road, having no reference to water. A county bridge may be either a foot, horse, or carriage bridge. A private bridge is any bridge which does not answer the description of a county bridge or a public highway. It is subject to no other laws than the general laws of property.

The liability to repair a county bridge depends either on the common law or on the statute law. By the common law the expense of maintaining both county bridges and highways is to be defrayed by the public, this having been part of the trinoda necessitas to which every man's estate was formerly subject. [Trinoda Necessitas, P.C.] But the burden of repair of county bridges is thrown on the whole county, that of highways on the inhabitants of the parish wherein such highways lie. Primâ facie, therefore, by the common law the whole county is liable to repair a county bridge; but they may rebut this presumptive liability by showing that for some reason or other the burden has been shifted from them on another. They may either show that a hundred, or a parish, or some other known portion of a county is by custom chargeable with the repair of a bridge erected within it; or that some person, individual or corporate, is liable to that expense. In the case of private individuals, such liability may depend either on tenure, that is, by reason that they and those whose estates they have in the lands or tenements are liable in respect thereof;—or on prescription. In the case of corporate bodies, on prescription only. With regard to corporate bodies, Lord Coke says, 'If a bishop or prior, &c. hath at once or twice of almes repaired a bridge, it bindeth not (and yet is evidence against him, until he prove the contrary); but if time out of mind they and their predecessors have repaired it of almes, this shall bind them to it.' (2 *Inst.* 700.) Any bridge answering the definition above given of a county bridge may become a charge upon the county even though not originally built by the county; as, for instance, if it be built by the crown or by a private individual: but not every bridge which answers the above definition is therefore chargeable to the county for repair, unless it be also used by and useful to the public. The public use and benefit seem to be the criterion: and if a private individual build a bridge of any sort, which is principally for his own benefit and only collaterally of benefit to others, he will be liable to the repair, and not the public: but where the public derive the principal benefit, they must sustain the burden of repairing it, on the ground that it would greatly discourage public-spirited persons from erecting useful bridges if they were ever after to be burdened with the costs of repair. The county are even liable to the repair of a public bridge erected by commissioners under an act of parliament, even though the commissioners are empowered to raise tolls in order to support it, or though other funds are provided for the repairs; unless there be a special provision for exonerating them from the common law liability, or transferring it to others. This common law liability of a county to repair a public bridge is so strong, that although it has been erected and constantly repaired by trustees under an act of parliament, and although there are funds for the repairs, the county are still liable to it. And where trustees under a turnpike act build a bridge across a stream, where a culvert would have been sufficient, but a bridge was better for the public, it was held that the county could not refuse to repair such bridge on the ground that it was not absolutely necessary.

The first statute on this subject is the 22 Henry VIII. c. 5, called 'the Statute of Bridges.' This statute is merely in affirmance of the common law. In course of time, owing to the indistinctness of the principle on which public bridges were divided into county bridges and highways, it was found expedient to pass an act to clear up the doubts and difficulties arising from this principle. In order, therefore, to ascertain more clearly the description of bridges hereafter to be erected, which inhabitants of counties shall and may be bound or liable to repair and maintain, it is enacted by stat. 43 Geo. III. c. 59, § 5, that no bridge hereafter to be erected in any county at the expense of any individual or private person, body politic or corporate, shall be deemed to be a county bridge, unless it shall be erected in a substantial and commodious manner under the direction or to the satisfaction of the county surveyor, or person appointed by the justices of the peace at quarter-sessions to superintend and inspect the work. This act applies only to bridges newly built, and not to those repaired or widened.

It was found in very early times that many practical difficulties arose from the indistinctness of the common law as to the precise limits of a bridge—that is to say, as to the precise point where it ceased to be a bridge and began to be a highway; and vice versâ. This indistinctness gave rise to many disputes about the liability to repair, and it was found expedient to enact, by stat. 22 Henry VIII. c. 5, § 9, that such part and portion of the highways as lie next adjoining to the ends of any bridges within this realm, distant from any of the said ends by the space of 300 feet, be made, repaired, and amended as often as need shall require; and that the justices of the peace should act respecting the repairs of such highways as they were empowered to act respecting the bridges themselves. The effect of this statute was merely to limit or fix the length of road which the county was to repair at 300 feet. By the common law the county was bound to repair the roadway at the end of every county bridge, but the length was not precisely determined till the passing of the above statute.

But this liability of the county has been very much narrowed by the stat. 5 & 6 Will. IV. c. 50, § 21 (the General Highway Act), which, with respect to bridges to be built after the 20th of March, A.D. 1836, enacts, 'that if any bridge shall hereafter be built, which bridge shall be liable by law to be repaired by and at the expense of any county, or part of any county, then and in such case all highways leading to, passing over, and next adjoining to such bridge shall be from time to time repaired by the parish, person, or
body politic or corporate, or trustees of a turnpike r
were by law, before the erection of the said brid
to repair the said highways: provided, neverthe
nothing herein contained shall extend to exonerate
or part of any county from repairing the walls,
fences of the raised causeways and raised approac
such bridge or the land arches thereto.'

Till late years no persons could be compelled t
to contribute to the building of any new bridge,
act of parliament; and even when the county was
repair a bridge, it was not therefore bound to wider
could the inhabitants of a county by their own
change the situation of a bridge. But by the stat
II. c. 33, § 1, and 43 Geo. III. c. 59, § 2, the
quarter-sessions are enabled to compel the county to
change the situation of old bridges, or build new on
also 54 Geo. III. c. 90, which extends some of the
of those statutes.)

With respect to the appointment of surveyors
bridges, their duties and powers, and the modes
such powers are to be exercised, see stats. 22 Hen.
5, § 4; 43 Geo. III. c. 59 (coupled with stat. 5
IV. c. 50); 54 Geo. III. c. 90; 55 Geo. III. c. 1
various provisions of these statutes are very numerou

For the mode of taxing and collecting the mone
sary for the repairs of bridges and the highways at
thereof, see stat. 22 Hen. VIII. c. 5; Anne 1, stat.
12 Geo. II. c. 29; 52 Geo. III. c. 110; 55 Ge
143.

In case of non-repair or nuisances, either to b
highways, the modes of prosecution are the same: n
criminal information, presentment, or indictment.
speaking, an action cannot be maintained against t
by an individual for the non-repair of a county brid
in some cases of special damage accruing to such
from the non-repair.

A criminal information is very rarely resorted to,
in cases of either very aggravated neglect or wh
seems to be little chance of obtaining justice by pr
indictment.

The presentment of a public bridge for non-re
may by common law be before the Queen's Bench
Assizes. By the stat. 22 Hen. VIII. c. 5, § 1, pr
may be made before the justices in general sessions,
may proceed therein in the same manner as the judg
Queen's Bench were in the habit of doing, 'or as
seem by their directions to be necessary and conv
the speedy amendment of such bridges.' See also
regulations respecting presentments, 1 Anne, sess.
12 Geo. II. c. 29, § 13; 55 Geo. III. c. 143, § 5.

The indictment of a county bridge is subject to
rules as any other indictment. And though the wh
be liable to the repairs, any particular inhabitant of
or tenant of land charged to the repairs of a bridge,
made defendant to an indictment for not repairing i
liable to pay the whole fine assessed by the cour
default of repairs, and shall be put to his remedy at
contribution from those who are bound to pay prop
share in the charge.

The malicious destruction or damaging of public
said to be punishable as a misdemeanour at common l
it is a nuisance to all the king's subjects. By 7 & 8
c. 30, § 13, it is enacted, 'that if any person shall
and maliciously pull down or in any wise destroy a
bridge, or do any injury with intent and so as th
render such bridge, or any part thereof, dangerous o
able, every such offender shall be guilty of felony.

(For further information see Lord Coke's *Secon*
Burn's *Justice*; Russell *On Crimes*. For the law o
viewed as highways, see Ways, P. C.)

BRIDGEWATER TREATISES, a series
which were published in accordance with the last W
Right Honourable and Reverend Francis Henry,
Bridgewater, who died in February, 1829. The W
February 25, 1825, directed certain trustees to inv
public funds 8000*l*., which sum, with the dividends
thereon, was to be at the disposal of the Presiden
time being, of the Royal Society of London, to be p
person or persons nominated by him. The testat
directed, that the person or persons selected by the
sident should be appointed to write, print, and pub
copies of a work 'On the power, wisdom, and go
God, as manifested in the creation; illustrating s

ıable arguments, as, for instance, the variety and
: God's creatures in the animal, vegetable, and
gdoms; the effect of digestion, and thereby of
the construction of the hand of man; and an in-
' of other arguments; as also by discoveries an-
ıodern, in arts, sciences, and the whole extent of
He also desired that the profits arising from the
rorks so published should be paid to the authors
s.

President of the Royal Society, Davies Gilbert,
ıe assistance of the Archbishop of Canterbury and
op of London, in determining on the best mode of
to effect the intentions of the testator. Acting
ıdvice, he appointed eight gentlemen to write se-
ises on the different branches of the subject, which
ublished, and are as follows:—
e Rev. Thomas Chalmers, D.D. 'The Adapta-
ernal Nature to the Moral and Intellectual Consti-
an,' 2 vols. 8vo., Glasgow, 1839.
hn Kidd, M.D. 'The Adaptation of External
ıe Physical Condition of Man,' 8vo. Lond., 1837.
e Rev. William Whewell. 'Astronomy and Ge-
es considered with reference to Natural Theology,'
ın, 1839.
r Charles Bell. 'The Hand, its Mechanism and
rments, as evincing Design,' 8vo., London, 1837.
ter Mark Roget, M.D. 'Animal and Vegetable
, considered with reference to Natural Theology,'
., London, 1840.
e Rev. Dr. Buckland. 'On Geology and Mine-
ols. 8vo., London, 1837.
e Rev. William Kirby. 'On the History, Habits,
ts of Animals,' 2 vols. 8vo., London, 1835.
illiam Prout, M.D. 'Chemistry, Meteorology,
ınction of Digestion, considered with reference to
cology,' 8vo., London, 1834.
l of Bridgewater also left upwards of 12,000*l.* to
Museum, the annual income arising from which he
be employed in the purchase of manuscripts, and
ıe care of them for the use of the public.

E, a term of frequent use in the law of Scotland,
the English brief, has a common root with the
ief, a letter or written paper. Its general charac-
t contains permission or directions to make an in-
ding certain matters. It would appear that when
e civil court consisted of a committee of Parliament,
to pursue before such a body was granted by
ı the Chapel Royal of Chancery, containing the
n which a decision or answer was required. Of
s now conducted by brieves, the most important
st for service of heirs. This form is necessary for
resting an heir in his ancestor's landed property.
stor was himself feudally invested, the heir sues
re from Chancery, directed to the sheriff of that
re the lands lie, or if they lie in different counties,
iff of Edinburgh, requiring him to empanel a jury,
h their finding to return answer to certain questions.
and corresponding answer, or 'Retour,' set forth
of the person who was last invested in the property;
whether as heir at law or by special provision, in
heir succeeds, &c. This process is termed a
ervice. If the last proprietor was not feudally in-
process is called a General Service, or a General-
rvice: the former, when the claimant is heir at
latter, when he claims under any particular provi-
both these kinds of service, the brieve is the
at in a special service, but the retour leaves the
questions unanswered. Where there is more than
ı claiming the character of heir, separate brieves
ken out, and a competition may take place before
which may be, and generally is, carried into the
Session. The other brieves known in the law of
re:—the brieve of Tutory, by which an inquiry is
the person legally entitled to be tutor to a minor
as it is termed in England, an infant; the brieves of
d Furiosity, by which inquiry is made as to the
f his imbecility or insanity, before a person is ju-
prived of the management of his affairs; the brieve
for assigning the portion of the deceased husband's
which is to be the widow's terce; the brieve of
for settling the claim of heir's portioners; and the
Lining and of Perambulation, for settling disputed
h.

BRIGGS, HENRY PERRONET, R.A. This distinguished painter, both in history and portrait, died in London, in January, 1844, aged fifty-one. He was of a Norfolk family, and was related to Opie the painter. He commenced his career as a portrait-painter, and first appears as an exhibiter on the books of the Royal Academy in 1814. In 1818 he exhibited a picture of 'Lord Wake of Cottingham setting fire to his castle, to prevent a visit from King Henry VIII., who was enamoured of his wife.' In the year following he exhibited a subject from Boccaccio (Gior. viii. Nov. 3), representing Calandrino, a Florentine painter, thinking he had found the 'Elitropia,' and thereby become invisible, pelted home by his companions Bruno and Buffalmacco. These were followed by others of a higher class, as Othello relating his adventures to Desdemona; the first Interview between the Spaniards and the Peruvians; and George III. on board the Queen Charlotte, presenting a sword to Earl Howe, after the victory of the 1st of June, 1794. The last picture was presented in 1825 by the British Institution to Greenwich Hospital. In 1831 he exhibited a large picture of the antient Britons instructed by the Romans in the Mechanical Arts, for the Mechanics' Institute at Hull. He was elected an Academician in the following year, from which time he was nearly exclusively employed in portrait-painting. His portraits are very effective as regards colour; but the colouring is rather conventional, and the features are not sufficiently modelled. Many of the nobility have been painted by Briggs, and also the following well-known persons:—Sir S. Meyrick, Baron Alderson, Sir Fowell Buxton, Rev. Sidney Smith, Mrs. Opie, Mrs. Siddons, Charles Kemble, Duke of Wellington, and many others. (*Art Union*, March, 1844.)

BRIL, PAUL, a celebrated landscape painter, was the younger brother and pupil of Matthew Bril, whom he greatly surpassed. He was born at Antwerp, according to Van Mander, in 1556, and received his first instruction from D. Wortelman; but having heard of the success of his brother at Rome, who was in great esteem there as a landscape painter during the pontificate of Gregory XIII., Paul joined him at Rome, and soon became not only a sharer of his brother's prosperity, but acquired a much greater reputation there. Matthew died in 1584, aged 34, and from that time Paul pursued an unrivalled career at Rome. No Italian had up to this period turned his attention exclusively to landscape with success, and Paul's ability was the more valued. He executed several large landscapes in oil, in the apartments of the Pope and other dignitaries of the church; in many cases, views of the villas or summer residences of his employers, all painted from nature, views, no doubt, in their town residences, if well executed, calculated to afford the highest gratification. He painted landscapes also in several churches, some in fresco, and of very large dimensions. In many of his works he introduced figures from the stories of ancient mythology, and Annibal Carracci is said to have sometimes painted the figures. He painted also many small easel pictures, often on copper, which are very highly finished; the foregrounds are fresh and bold, and the distances are well managed. His masterpiece was considered a large landscape in fresco, in the Sala Clementina in the Vatican, painted in 1602 for Clement VIII., and representing the Martyrdom of St. Clement: it was sixty-eight feet long and of considerable height. Paul died at Rome in 1622: his age and death are differently given by Baldinucci, who says he died in 1626, aged 72.

Several of Paul Bril's pictures have been engraved, and he executed a few etchings himself. There is a print of him by De Jode after a portrait by Vandyck.

(Van Mander, *Het Leven der Schilders*, &c.)

BRITISH INDIA. [INDIA, P. C. S.]

BRITISH HUSBANDRY. [HUSBANDRY, P. C.]

BRIZA, a genus of grasses [GRAMINACEÆ, P. C.] belonging to the tribe Festucineæ, of that order. It has nearly equal, broad, 3-ribbed glumes; 3-8 flowers densely imbricated in a short distichous spikelet; the outer palea navicular, heart-shaped, obtuse, rounded on the back, unarmed; the glumes and paleæ membranous with a scarious margin; terminal styles. Two species of this grass are natives of Great Britain, the *B. minor* and *B. major*. They are known by the common names of Quaking-grass and Maiden's-hair. Their dense clusters of flowers are hung upon the ends of a very delicate filamentous peduncle, forming an elegant panicle which shakes with the slightest breath of air, hence the name quaking-grass. Both the species grow in pastures, but do not yield much nutriment for animals, which feed upon it.

(Babington, *Manual of Botany*.)

BRI'ZIO, FRANCESCO, a distinguished Bolognese painter, and one of the best of the scholars of the Carracci, was born at Bologna in 1574. He was a journeyman shoemaker until his twentieth year, when by the permission of an uncle, he was allowed to learn painting under Passerotti. He however soon made sufficient progress to perceive that the school of Ludovico Carracci was a surer road to success than the instruction of Passerotti, whom he accordingly left, and in the school of the Carracci he became a favourite of both Ludovico and Agostino, for he devoted himself to engraving as well as painting. In painting also, Brizio did not, as is too often the case, restrict his studies to the human figure and its draperies, but he divided his labours between the figure, perspective, architecture, and landscape. He was superior in these accessory parts of painting to all his Bolognese contemporaries, and, says Lanzi, was, with the exception of Domenichino, the most universal genius of the school of the Carracci. His masterpiece is the Coronation of an image of the Virgin in the church of San Petronio. He died in 1623, aged 49. His son Filippo Brizio, and Domenico degli Ambrogi, called Menichino del Brizio, were his principal scholars, and were both very able painters.

Gandellini describes many prints by Brizio after the Carracci, Correggio, and others; 31 are noticed by Bartsch in the 'Peintre-Graveur.' They are executed in the style of Agostino Carracci, are scarce, and are much prized by collectors. Brizio is better known for his prints than his pictures.

(Malvasia, *Felsina Pittrice;* Gandellini, *Notizie Istoriche degli Intagliatori*, &c.; Lanzi, *Storia Pittorica*, &c.)

BROME, RICHARD, originally a servant of Ben Jonson, gained a well-merited reputation as a comic dramatist. Of his life hardly any particulars are known; and it is only by inference that he is set down as having died in 1652. His extant comedies are fifteen. The earliest of these, 'The Northern Lass,' was printed in 1632. Five others appeared in one volume, in 1653; and five more in a second volume, published in 1659. His 'Jovial Crew, or the Merry Beggars,' has a place in the tenth volume of Dodsley's 'Old Plays.' Both it and several of the others are good specimens of dramatic composition in the school of Brome's old master. They possess, in particular, great force in the representation of character. Altogether he may fairly be ranked among the best of our old dramatists of the second class.

BROME, ALEXANDER, born in 1620, became an attorney in London. He was attached to the royalist party throughout the civil wars; and, while his bacchanalian poems were popular among the cavaliers, he rendered them more direct service by his satirical attacks on their enemies. He was the reputed author of most of the songs and epigrams in which the Rump Parliament was held up to ridicule. A collected edition of his poems, original and translated, was published in 1661. Several of his smaller pieces, lively and playful, though not very vigorous or original, are given by Campbell in his 'Specimens.' Among his compositions were contributions to a translation of Horace, by Cowley, Fanshaw, and others. He left also a comedy, 'The Cunning Lovers,' printed in 1654. He died in 1666. The first collected volume of Richard Brome's plays was edited by him.

BROMIDE OF POTASSIUM—*Medical Properties of.* This salt may be formed by direct combination of its constituent ingredients by dissolving bromine in liquor potassae, a method preferable to the indirect and circuitous plan ordered in the London Pharmacopœia. The crystals, which are destitute of water of crystallization, form transparent cubes or quadrangular prisms, resembling those of iodide of potassium (from which they may be distinguished by evolving, when added to sulphuric acid, not violet fumes, but red suffocating ones, and by the solution giving to starch an orange colour). They are persistent at the ordinary temperature of the air, decrepitate by heat, are very soluble in water, both cold and hot, especially the latter, and sparingly so in alcohol. The taste is penetrating, saline, and cooling, not unlike common table-salt, which the crystals resemble in form, but from which it is most necessary to distinguish them, owing to the great potency of the bromide of potassium. In case of accidental poisoning by bromide, vomiting should be immediately
ited.

mine, in its action on the human system, resembles
is more potent, and the same holds respecting
ctivity of bromide of potassium, compared with
sium. It is requisite therefore to give it in
nd its use from time to time.

Bromine, mostly in the form of hydrobromate of
having been found in sea-water, and in many salin
such as that of Epsom, and that of Pittville, Chelten
in most springs the water of which resembles sea-
cept Droitwich, either alone or associated with iodine
larly those of Kreuznach in Rhenish Prussia, it was in
it would prove useful in the treatment of scrofulous
It may be given in the form of pills, or preferably
with excess of potass, in diluted liquor potassae.
this latter way that it has proved most useful. It
been used in baths, and likewise as an ointment.

The fact that many enlarged glands have lessen
its employment, led Dr. Williams to surmise that
prove beneficial in enlargements of the spleen. I
guine of good results, but the number of cases in wh
been used is insufficient to warrant any general co
and as this condition mostly happens in persons wh
is much impaired, either from a long residence in
tries or from having long suffered from agues, lit
expected from any agent. (Dr. Robert Williams,
of Medicine, i. p. 333.)

A bromide of iron has been formed, which is wo
tention, as well as a bromide of mercury: there is
bi-bromide of mercury.

BROMLEY, WILLIAM, a distinguished line
born at Carisbrooke in the Isle of Wight, in 1769.
his time with an engraver of the name of Woodin
London soon attracted the notice of several eminen
by his works. He was very much esteemed by
Flaxman, Fuseli, and Sir Thomas Lawrence.
popular of his early works are the prints to 'Mackl
and a 'History of England' after Stothard. He
several portraits after Sir T. Lawrence, including
Duke of Wellington, one on horseback, and Young
He engraved also the Woman taken in Adultery, aft
He was latterly almost exclusively engaged by the
of the British Museum, especially in engraving
Marbles from drawings made by the late H.
Bromley survived his son John Bromley, likewise
engraver, three years; he died in London in 18
been for many years an associate engraver of the
demy of London, and a member of the Academy of
at Rome.

John Bromley was born in Chelsea in 1795. H
his father's profession, but he chose a different bra
his works are in mezzotinto, in which line he ha
superiors. He died in 1839, aged only 44, leaving
and a large family to lament his loss.

Among his principal works are the following:—
of Lord William Russel, after Sir G. Hayter;
Grey refusing the Crown, after G. R. Leslie,
Monks preaching at Seville, after J. Lewis; the
Athol hunting in Glen Tilt, after E. Landseer,
Trial of Queen Caroline, after Sir G. Hayter;
Reform Banquet, after B. R. Haydon.

(*Art-Union Journal*, June, 1839; December,

BROMUS. [BROME-GRASS, P. C.]

BRONCHOTOMY. [TRACHEOTOMY, P. C.]

BRÖNDSTED, PETER OLUF, a distinguish
archaeologist, was born on the 17th of November,
Horsens in Jütland, where his father was pastor.
wards studied at Copenhagen, and in 1806 he accom
friend Koes to Paris. After a stay of two yea
capital, both friends went to Italy. In 1810 a par
ing of Bröndsted himself, Koes, the architect Halle
lerstein, Linckh, and Baron Stackelberg, undertook
to Greece, where Bröndsted and Stackelberg in
made very extensive excavations, by which great
thrown upon various subjects of antiquity. In 18
sted, on his return to Copenhagen, was appointed
Greek literature in the university of that city.
occupied himself with preparing the results of his
tions in Greece for publication, but as he found that
rary resources of Denmark would not enable him
out his plan as he wished, the Danish govern
prevailed upon to appoint him agent at the papa
Rome, which post he entered upon in 1818. Af
settled at Rome, he visited, in 1820 and 1821,
Islands and Sicily; and when the artistic portion o
was completed, he obtained leave to visit Paris, to
printing of the work itself. From Paris he made a
1826 to England, and the year after to Denmark,
was honoured with the title of counsellor of leg

8, on his return to Copenhagen, he was appointed Director e Royal Museum of Antiquities, and ordinary professor hilology and archaeology. In 1842 he was Rector of the ersity; but, in consequence of a fall from his horse, he in the same year, on the 26th of June.

he principal works of Bröndsted are his 'Travels and In- gations in Greece, with Representations and Explanations ewly discovered Monuments,' which were published ltaneously in German and French, Paris, 1826-30, 2 parts,

After the publication of this work he was severely at- ed in the journal called 'Hermes' (vol. xxxii.), for having e too free use of Villoison's MSS. in the royal library at s, especially with respect to the island of Ceos. Brönd- defended himself in a pamphlet entitled 'Ueber den atz im Hermes: ein Beitrag zur Geschichte der Pas- e,' Paris, 1830; another defence had been published the r before by his friend Hage, under the title 'Bröndsted Villoison,' Copenhagen. Among his numerous antiqua- dissertations, the two principal were published in En- h, 'A brief description of Thirty-two painted Greek es found near Vulci,' London, 1832, and 'The Bronzes of s,' London, 1836, fol., published at the expense of the ety of Dilettanti. A translation, in German, of this work h some additions, &c. by the author, appeared at Copen- n in the following year, 4to., 1837. Two other works of ay be mentioned as of considerable value to the historian, ; 'Beiträge zur Dänischen Geschichte aus Nordfranzösi- n Manuscripten des Mittelalters,' Copenhagen, 1817-18, rts, and secondly, 'Denkwürdigkeiten aus Griechenland en Jahren 1827 und 28, besonders in Militärischer Be- ng,' Paris, 1833. This last however was only edited öndsted, the substance being taken from the posthumous s of Major Frederic Müller of Altdorf, who had served e Greek war.

ides the above publications, most of them pointing to stration of antient Greek art, and highly characteristic e warm devotion of Bröndsted to that subject, he had long occupied on the elaborate essays on the composition tails of the sculptures on the pediments of the Parthenon ens—in aid of which he had had engravings executed of of the entire groups, and of the separate figures—the r became a few years ago the property of the Society of anti. The essays, although never completed for the s were liberally communicated by the author to others, hey have formed the basis of some of the most recent es and publications on the subject.

ndsted was also the author of a paper addressed to the at King of Denmark, and printed at Naples, in 1840, in alian language, on the bronze helmet discovered in 1817, Olympia, bearing the inscription of Hiero, son of Dino- s; and a memoir on the Panathenaic Vases, published e Royal Society of Literature, London, 1833.

rockhaus, *Conversations-Lexicon*, 9th edit.; *MS. Com- cation.*)

BRONZI'NO, A'NGELO, a celebrated Italian historical portrait painter, was born at Montecelli, near Florence, 01 or 1502. He was the scholar of Pontormo, and the d and contemporary of Vasari, and like him an enthusi- admirer of Michelangelo. Though Bronzino was not elf one of the gross anatomical mannerists with which ence abounded in the latter part of his own life, he was one he most influential causes of the predominance of the anato- l school, for by his unbounded admiration of Michel- lo, he set an example to the younger artists less able to minate the good from the bad in Michelangelo's style, they of course appropriated what was most obvious to their es and most easy of acquirement. Alessandro Allori, nephew and favourite pupil of Bronzino, was one of the t uncompromising leaders of this school.

ronzino painted in fresco and in oil; and executed many e-pieces and other smaller easel pictures, which are scattered various parts of Europe, but his reputed masterpiece is in the Imperial Gallery at Florence, and represents the ent of Christ into Hell, or Limbo; it has been engraved J. B. Cechi. He was also a poet: he died in 1570 or 1. Alessandro Allori and his son Christofano Allori fre- ntly adopted the surname of Bronzino, and it is a name applied to them in catalogues.

(Vasari, *Vite de Pittori*, &c.; Lanzi, *Storia Pittorica*,)

BRORA COAL. Beds of very poor coal, lying in the t of the oolitic deposits in the district of Brora in th Scotland and near Scarborough in Yorkshire, are thus termed. The coal is perhaps composed principally of Equiseta.

BROWN, THOMAS, better known by the familiar name of 'Tom Brown,' was born in Shropshire, in the year 1663. At the age of fifteen he entered as a servitor of Christ Church, Oxford; but he left the university in disgrace without taking a degree, and, going to London, became a Grub-street writer. The most respectable part of his career was his holding for a short time the mastership of the free school at Kingston-upon-Thames. Among those hangers-on of literature whose character and conduct made the title of author disreputable in the latter part of the seventeenth century, Tom Brown was one of the most notorious. He was habitually attached to vicious indulgences, inveterately fond of low society, and indolent to a degree which made him unfit to earn his bread steadily by the equivocal kind of literary labour which was his trade. But his talents were of no mean order. His published writings, almost all of which were satirical squibs in prose or verse, are full of coarse and humourous buffoonery. Their gross personalities, however, more than once brought him into trouble, and were restrained by no considerations either of safety or of decency. Dryden, Sherlock, and Titus Oates, alike suffered under his lash. His earliest pamphlet, 'The Reason of Mr. Bayes' changing his Religion,' appeared in 1688; and from that time till his death in 1704, he continued, by a series of ephemeral productions, to justify Anthony Wood's description of him as 'a frequent and satirical writer.' Wood gives a catalogue of his publications. They are not nearly all included in a collection professing to contain his works, which appeared in four small volumes in 1707, and was several times reprinted before the middle of the last century.

BROWN, LANCELOT, styled by Repton 'the immortal Brown,' but more frequently designated by the familiar *sobriquet* of 'Capability Brown,' who was originally a kitchen-gardener, raised himself to be the eminent landscape-gardener of his day. and 'improver of grounds,' as to which he was considered the oracle of taste; and he also acquired no small degree of reputation by his skill in architecture. He was born at Kirkharle in Northumberland, in 1715, and in the early part of his life was in the service of Lord Cobham as one of the persons employed in the gardens and grounds at Stowe. After which he was similarly engaged by other persons of distinction, but of his rise until he formally established himself *professionally* as an artist-gardener, we have no account. His personal history is a scanty but an enviable one; he not only realized a handsome fortune, but he graced his acquired station of gentleman by the manners and feelings of one. After having arrived at the dignity of high sheriff for the county of Huntingdon, which office he filled in 1770, he died in 1773. Testimony to his private worth as a man is borne not only by the character given of him by Repton and others, but the epitaph on him by Mason, who says,

'But know that more than genius slumbers here,
  Virtues were his that art's best powers transcend;
Come, ye superior train, who these revere,
  And weep the Christian, husband, father, friend.'

Great however as was his vogue as a landscape-gardener, his taste has since been very much questioned, and even severely so by Price, who accuses him of having done sad mischief by attempting to reform natural scenery and reduce it to rule, and of having thereby sinned against good taste even more than his predecessors by their formally laid out gardens and straight hedges and avenues. In fact, while endeavouring to avoid the formality which had become 'old-fashioned,' Brown fell into what was little better than formal mannerism and routine, applying to every scene alike the same set of features—'clumps,' 'belts,' and 'serpentine canals.' As an architect, in which profession he naturally confined himself to country mansions, he excelled in all that related to internal arrangement and accommodation, for the houses erected by him have been allowed to be models of comfort and convenience. Among those executed or altered by him, is the Earl of Coventry's at Croome, with the lodges, church, and other buildings, the recorded date of which, 1751, shows that he was then in practice as an architect. At Fisherwick he erected the house, offices, and bridge for the Earl of Donegal; made additions at Burleigh, for the Earl of Exeter; additions at Prior Park near Bath, 1765; the picture-gallery at Corsham; considerable alterations at Trentham (now succeeded by more extensive ones by Barry); mansion for the Earl of Newbury at Redgrave, 1765; alterations at Nuneham, and the house at Claremont. now occupied by Queen Victoria. This list might be considerably extended, for it happens very singularly that we possess a fuller and more authentic catalogue of Brown's architectural labours than of those of any one else in that profession; we shall however merely add that he designed several of the buildings in the gardens at Stowe.

(Repton *On Gardening*, by Loudon.)

BROWN, DR. JOHN, an unfortunate man of letters, was born in 1715, at Rothbury, in Northumberland, where his father, a Scotchman, was curate. He studied at St. John's College, Cambridge, and took his degree with reputation: after which he resided for some years at Carlisle on a minor canonship and lectureship, and distinguished himself by acting bravely as a volunteer in the rebellion of 1745. He successively held and resigned several livings in the church. Of these one at least was procured through the influence of Warburton; a patron however whose letters show him to have treated with little tenderness Brown's capriciousness of temper, caused doubtless in part by his latent tendency to mental derangement. In 1766 the reputation which his writings had obtained gained for him an invitation from the Empress of Russia to visit St. Petersburg, and assist in organizing a scheme for public education. Ill heath compelled him to decline the engagement. Other vexations preyed upon his spirits; and in September of the same year, seized with a fit of insanity, he cut his throat. Brown's works were both numerous and diversified, in verse as well as in prose. His versified 'Essay on Satire, was prefixed by Warburton to his editions of Pope's works. His tragedy of 'Barbarossa,' brought upon the stage in 1755, was highly successful for a time in spite of its extravagance and feebleness, and has been reprinted in more than one collection. Its successor, 'Athelstan,' was not so fortunate. His principal prose writings were the following:—'Essays on the Characteristics of Lord Shaftesbury,' 1751; 'An Estimate of the Manners and Principles of the Times,' 1757, 2 vols. 8vo., a work which went through seven editions before the end of the next year, and received, abroad as well as at home, an attention which it owed to its severity of animadversion on national vices rather than to its merits as a philosophical speculation; an 'Additional Dialogue of the Dead, between Pericles and Cosmo,' 1760, which was a defence of the political character and conduct of Lord Chatham; and a 'Dissertation on the Rise, Union, and Power, the Progressions, Separations, and Corruptions of Poetry and Music,' 1763, a treatise of considerable ingenuity. All his works are enumerated in the long article under his name in the 'Biographia Britannica.'

BROWNE, WILLIAM, one of our minor English poets, was born in 1590, of a good family, at Tavistock in Devonshire. He resided at Exeter College, Oxford, but left the university without a degree, and went to London, where he entered at the Inner Temple. In 1624 he returned to his college, and acted as private tutor to Robert Dormer, afterwards Earl of Caernarvon; and the degree of M.A. was then conferred on him. He afterwards resided in the family of the Earl of Pembroke; and it is said by Anthony Wood that he was able to amass money enough to purchase an estate. The time of his death is uncertain; but it may have happened in 1645. His principal poems are Eclogues; a long series entitled 'Britannia's Pastorals;' a shorter entitled 'The Shepherd's Pipe.' In the narration of events, and in the delineation of characters or passions, he is feeble, confused, and tedious, especially in his more elaborate series of pastorals. But his poetry abounds in beautiful landscapes, painted with much delicacy of feeling and not without frequent richness of fancy. In 1772 there was published a complete edition of his poems, in three volumes, 12mo., which contained his 'Inner Temple Masque,' printed for the first time from a Bodleian manuscript, transcribed by Dr. Farmer.

BRU'CEA, a genus of plants named in honour of James Bruce, the celebrated traveller in Abyssinia, belonging to the natural order Rutaceæ. It has the following characters:—Flowers monœcious; calyx 4-parted; petals 4, hardly equal the length of the calyx; stamens 4, inserted round about a 4-lobed gland-like central body; the pistilliferous flowers with four abortive stamens; ovaries 4, seated on a 4-lobed receptacle, each terminated by a single, acute, reflexed stigma; fruit a drupe, 1-seeded. The species are shrubs, with unequally pinnated leaves, 6 pairs of opposite, entire, or serrated leaflets, without dots.

B. antidysenterica (*Brucea ferruginea* of L'Heritier), Woodginoos, has entire leaflets covered with rusty villi on the nerves beneath; racemes simple, spike-like. This plant is a native of Abyssinia, and is said to be a tonic and astringent, and to act favourably in dysentery. By some mis
at one time supposed to be the plant which yielde
Angostura bark of the shops. By the substitu
false Angostura for the true Angostura bark, [
P. C.] fatal effects have been known to follow.
that the false Angostura bark was supposed to be t
of *Brucea ferruginea*, an alcaloid was discovered in i
been called on that account Brucia. [Brucia, P. C.]
now however, that there can be little doubt th
Angostura bark of the shops is a species of *Stry*
this subject Dr. Christison, in the last editi
Dispensatory, has the following remarks:—The
bark (*Galipæa Cusparia*) of this country is seld
rated. But on the Continent a most serious frau
often practised, by the substitution of a highly pois
long erroneously conceived to be that of the *Br*
ginea, or *antidysenterica*. This bark, commonly
Angostura, presents externally a dirty greyish yel
with numerous irregular spots or tubercles of a li
tint; which appearances are in the larger pieces
patches, or entirely, by a uniform, loose, bright, rus
efflorescence. The speckled grey pieces alone be
semblance to the smaller pieces of true Angostu
easily distinguished by their greater thickness, th
intense bitterness, without either aroma or pun
also, as the Edinburgh College has indicated, by th
fracture becoming bright red when touched with
Another excellent character mentioned by the C
applicable only where rusty specks exist, is that
become deep bluish green with the same acid; wh
other hand, scarcely affects the true bark. Nitri
not similarly alter the spurious bark, where it is q
rusty efflorescence. Fatal accidents from the sub
the spurious for the true bark were at one time not
on the Continent; and in Austria they were so fr
upon one occasion the government ordered the wh
tura bark in the empire to be destroyed. This
has never been publicly noticed in Britain, and
wholesale and retail dealers, whom I have cons
here and in London, were unaware of its existen
weeks ago, however, Dr. Moore Neligan of Dubli
me that on inquiring for Angostura bark at an ex
respectable drug-warehouse in that city, he got t
bark; which proved to have been part of a conside
kept in the establishment, since at least the begin
century, but never previously displaced. From s
owe to the kindness of Dr. Neligan, there can be
the accuracy of his observation; so that druggists
aware of the possible risk, even in this country, o
an error.'

B. Sumatrana has serrated leaflets villous be
racemes usually compound, the petals longer than
This plant is a native of Sumatra, the Moluccas,
Cochin-China. The leaves are intensely bitter,
the same medicinal properties as the former.

(Christison, *Dispensatory*, 1842; Don, *Gard*
tionary.)

BRUGES, ROGER VAN, an old Flemish pai
pupil of John Van Eyck, is called by Vasari, R
Bruggia, but is not the same person as Roger Van d
as some have supposed. Van Mander notices b
tinct persons; the subject of this article, he calls
Brugge, and speaks of him as an excellent draug
good painter, but he does not give any personal i
concerning him: the years of his birth and deat
unknown, but several works are attributed to hi
various dates between 1445 and 1462. He is menti
ral times by Bartholomaeus Facius, 'De Viris I
Florence, 1745; and Rathgeber, 'Annals of Pa
in the Netherlands,' p. 105, enumerates twenty-t
attributed to him. He is styled by Facius, Rog
licus Joannis Discipulus, and he is probably the sa
as Magister Rogel of Flanders, by whom there are
tures, in one, painted in 1445, in the sacristy of th
sian church at Miraflores, near Burgos in Spain, th
of Don Juan II.

Roger painted in water-colours, with white of e
size, and in oil, which last method he had learn
Eyck. He painted also on canvas, a rare practi
early period: Van Mander speaks of Roger's pa
canvas, of which he had seen many in churches,
vate houses, where they were adopted as substitu
ordinary hangings of drapery.

ere are at Munich three admirable old pictures in the othek (Cabinet iii. Nos. 35, 36, 37), assigned in the gue to John Van Eyck, which a writer in the 'Kunst- (1841, No. 5) has attributed to Roger van Bruges; re three of the best and most interesting in the collec- they are included in the twenty-nine pictures enume- by Rathgeber.

n Mander, *Het Leven der Schilders*, &c.; Rathgeber, *len der Niederländischen Malerei, Formschneide- und rstecherkunst.*)

ULLIOT, FRANZ, author of the 'Dictionary of grams,' &c., was born at Düsseldorf in 1780, and was n of Joseph Brulliot, a native of Mannheim, and in- r of the celebrated Gallery of Düsseldorf, which was ed in 1805 to Munich. Joseph and his son Franz, ad adopted engraving as his profession, removed thither same time, and in 1808 Franz Brulliot was appointed nt keeper of the king's prints. From this time he gave practice of engraving and devoted himself entirely to dy of prints and the history of engraving, and in 1817 he hed, at Munich, in 4to., a Dictionary of the Monograms, f artists—'Dictionnaire des Monogrammes, Chiffres, s Initiales,' &c., to which, in 1820, he commenced the ation, in the same form, of a supplementary work, en- 'Table Générale des Monogrammes, Chiffres,' &c., hich was never completed. His great work did not r till after an interval of twelve years from that date, hole of which time was exclusively devoted to it. He l the principal collections of France, Germany, and d, to the same end, and his occupations as keeper of nts of the king of Bavaria, to which post he had been ted, gave him peculiar facilities for his labour. The te work was published in Munich in three volumes, vo., in 1832-33-34, under the title 'Dictionnaire des grammes, Marques Figurées, Lettres Initiales, Noms és, &c., avec lesquels les Peintres, Dessinateurs, rs, et Sculpteurs ont désigné leurs Noms.' It is a f immense labour, is very accurate, and is incomparably st complete work of its kind. In vol. i., containing nograms, there are 3292 articles; in vol. ii., containing tial letters, there are 2936 articles; and in vol. iii., con- the abbreviations and appendices to the three parts, there 8 articles; and the work contains also facsimiles, cut in of all the marks and letters, &c. treated of, amounting y thousands. Brulliot did not long survive the publi- of his work; he died of the cholera in 1836, at Munich. s an honorary member of the Academies of the Arts nich and of Vienna.

UNONIA'CEÆ, a natural order of plants belonging to y's aggregose group of monopetalous Exogens. This was defined by Robert Brown, and has for its genus which was named after him. He placed it as a of the natural order Goodenoviæ, but it is raised to the f an independent order by Professor Lindley. It has erior calyx in 5 divisions, with four bracts at the base; nopetalous corolla, almost regular 5-parted inferior ring; definite hypogynous stamens, alternate with the nts of the corolla; the anthers collateral, slightly coher- a 1-celled ovary, with a single erect ovule; a single enclosed in a 2-valved cup; a membranous fruit (a le) enclosed within the indurated tube of the calyx; a ry erect seed without albumen; the embryo with plano- x, fleshy cotyledons, and a minute inferior radicle. order has but one genus, of which there are two species. are herbs, natives of New Holland, having flowers of an blue, which are on scapes, collected in heads, and sur- ded by enlarged bracts.

lthough placed by Brown in Goodenoviæ, Lindley thinks fers essentially from that order 'in the superior 1-celled and capitate flowers, thus approaching some species of ceæ, but differing in the want of an involucel, the erect superior ovary, and peculiar stigma.' It agrees with ositæ in inflorescence, in the æstivation of the corolla, in markable joint or change of texture in the apex of its nts, and in the structure of the ovarium and seed. n remarks, that 'in the opposite parietes of the ovarium unonia two nerves or vascular cords are observable, are continued into the style where they become ap- nated and parallel. This structure, so nearly resembling f Compositæ, seems to strengthen the analogical argu- in favour of the hypothesis advanced in the present of the compound nature of the pistillum in that order, f its type in phænogamous plants generally; Brunonia having an obvious and near affinity to Goodenoviæ, in the greater part of whose genera the ovarium has actually two cells, with one or an indefinite number of ovula in each; while in a few genera of the same order, as Dampiera, Diaspasis, and certain species of Scævola, it is equally reduced to one cell and a single ovulum.'

(R. Brown, *Linn. Trans.*, xii. 132; Lindley, *Natural System*, 266.)

BRU'SA', PRU'SA', or BU'RSA' (Προῦσα), a celebrated town in the antient province of Bithynia, now Kójá-ílí, in Asia Minor, lies in 40° 11′ N. lat., 29° 26′ E. long., and is situated at the northern foot of the Bithynian Olympus, in a most picturesque and fertile country. Prusa is mentioned by Strabo (p. 564, Cas.) as a well-governed town, situated near the Mysian 'Olympus,' which is the same as the Bithynian; it must not be confounded with Prusa, the Prusias of Stephanus Byzantinus, formerly called Cius (Κῖος, Strabo, p. 563, Cas.), and Prusa ad Hypium, two towns which were likewise situated in Bithynia. Strabo (p. 564) says that Prusa was founded by Prusias, who carried on war against Crœsus, and his statement deserves more credit than that of Pliny (*Hist. Nat.*, v. 32), who says that it was built by Hannibal, alluding to the time when he was staying at the court of Prusias, king of Bithynia. Strabo's account is also followed or confirmed by that of Stephanus Byzantinus (v. Προῦσα), who calls Prusa a small town. The town rose only to importance after its capture by Orkhán, the son and successor of Osmán, the first sultan of the Osmanlis, who took it by capitulation a few weeks before the death of his father, in A.H. 726 (A.D. 1326). Prusa surrendered after a blockade of ten years, effected by means of two castles which Osmán built in the immediate neighbourhood of the town, one of which, the castle of Bálábánjik, is still standing. This event took place towards the end of the reign of the Greek emperor Andronicus II.

Prusa, or as we shall now write it, Brúsá, became the residence of Orkhán, and this sultan, as well as Mürád I., Bayázíd I., and Mohammed I., and several Turkish princes were buried in the new capital. The count of Nevers, a French prince of royal blood, and many French nobles who were taken prisoners in the battle of Nicopoli, were confined for several years in this place. Brúsá remained the capital of the Turkish empire to the capture of Constantinople in 1453, though during the last twenty years previous to this event the sultans used to reside at Adrianople. During several centuries it was the principal seat of Turkish learning, and its divines were notorious for their prejudices and fanaticism; but its inhabitants are now distinguished for their toleration and hospitality towards Europeans. The population is about 35,000; one quarter of the town is entirely peopled by Armenians; and there are also many Jews, the descendants of Spanish Jews who were driven from Spain towards the close of the fifteenth century, and who still speak Spanish among each other. A rapid torrent flows along a deep gap through the town, and divides the Turkish quarter from the Armenian. Brúsá is well supplied with fountains, and contains several very fine buildings, among which the great mosque is the most remarkable; in the mosque of Daúd Monasteri, rather a small building, is the tomb of Sultan Orkhán. There is a considerable trade at Brúsá in silk, saffron, Angora goat-wool, and other products of the country, and its carpets are renowned all over Turkey. There are several permanent European residents, mostly agents of German and Italian merchants. The port of Brúsá is at Mudánieh, on the Sea of Marmara, six leagues from Brúsá. The beauty of the environs of Brúsá baffles description, but the principal features of the town as well as the environs are the hot springs. The chief source is about a mile and a half west of the town; it rises out of a calcareous tuff or travertine, the formation of which is still going on in some places. Hamilton found the heat of the water to be 184° Fahrenheit; about a hundred yards farther west there is another spring, the temperature of which is 180° Fahrenheit, and there are several more in the neighbourhood, in some of which there is a considerable escape of sulphuretted hydrogen gas. The water of the springs unites in a warm stream of a temperature of 97° Fahrenheit, which is inhabited by the Melanopsis buccinoidea, a univalve shell of frequent occurrence in the rivulets of Asia Minor, but which prefers warm water to cold. Baths have been built at the two principal sources, which are much frequented by the Turks, and are used by the men and women on alternate days. In later years these baths have been visited by European patients, mostly residents of Constantinople.

(Baron von Hammer, *Umblick auf einer Reise nach Brusa und dem Olympos*; Hamilton, *Researches in Asia Minor*, vol. i. p. 71, &c.)

BRUSASORCI. [Ricci, Domenico, P. C. S.]

BRUSH. Notwithstanding the great variety of forms and qualities, adapted for uses the most different, brushes may here be considered under a few well-defined classes, to one or other of which every article of the brush kind may be assigned, and each of which, though comprising many very different kinds, is distinguished by an obvious character.

The first great distinction is that between what may be called *simple* brushes, which consist of a single bundle or tuft of bristles, hairs, or vegetable fibres, whether large or small, and *compound* brushes, which consist of several small bundles or tufts, separately inserted in a stock, foundation, or handle, of wood or other material, so as to act in combination with each other, but to present a mass of hairs or fibres of less solidity or density than a single or simple bundle of equal magnitude or brushing surface. Of what we here term simple brushes, an illustration is afforded by the kind of small brush used by artists under the name of a pencil, whether of camel's-hair or any other hairs. This instrument consists of a small tuft or bundle of hairs, carefully laid with their taper ends all in one direction, and having the opposite or root ends bound round tightly with thread. In order the better to secure the cylindrical tuft of hair thus formed, and also to afford convenient means for attaching it to a stick or handle for use, the tuft or pencil of hairs is passed through a quill tube of a slightly conical shape, which has been previously softened and enlarged by wetting; the points of the hairs being temporarily bound together and passed completely through the quill, from the larger to the smaller end, while the tied portion of the tuft, being larger than the point end, remains firmly fixed in the smaller end of the quill, which, as it dries, contracts upon the hairs with considerable force. As the quill is considerably longer than the portion of tuft or pencil left in it, its larger end forms a tube or socket for the reception of the pencil-stick. When well made, the hairs of such a brush should, if wetted, adhere together and terminate in a fine point; but if they are not properly put together, or are too tightly compressed by the small end of the quill, they will not do so, and the pencil is rendered unfit for delicate work. Hair pencils of this kind are made of every variety of size, from the smallest pigeon or crow quill to the largest quills of the goose, turkey, or swan; and as even the largest quills are not large enough for some kinds of brush or pencil, while in other cases quills are not sufficiently strong and durable, tin tubes are occasionally substituted for them, the handle or pencil-stick being then firmly fixed in the tube. Even the smallest kinds of pencil made of bristles, or of the harder kinds of hair, for oil-painting, are usually mounted with tin, and are known by the general name of *tools*. For some purposes tin-mounted tools are made flat instead of round, the hairs being arranged in a flat, or chisel-like, instead of a cylindrical form. The larger kind of bristle tools are not inserted in tubes, but are bound round very tightly and tied to the end of a wooden stick or handle, which is cut into a forked shape, so as to have a projecting fin on each side of the bundle of hairs. The tuft or pencil being laid in between these projecting pieces, the whole is very firmly and closely bound round with twine or thread, which is subsequently smeared over with glue, with which red-lead is occasionally mixed.

In all the cases above mentioned the brush may be said to be inserted in the handle. The next class of brushes to be mentioned comprises such as have the handle inserted in the tuft or bundle of bristles or hair. Among these are the large painting and dusting brushes used by house-painters, the bristles of which are first tied or wrapped round, with the smaller end of the conical wooden handle in their centre. The brush is then placed upon a block of iron perforated with holes to receive the handle, with the points of the bristles uppermost, and the conical handle is driven in with considerable force until the greater part of its length has passed through the brush to form the handle, while the thicker end remains in the middle of the tied portion as a sort of core. Such brushes are in fact hollow cylinders of bristles, although when new they appear solid, or nearly so; and, although they seem to be held together only by the quantity of string wrapped round them, they really owe their firmness to the compression occasioned by driving in the handle after the wrapping is completed. Excepting in the peculiar mode of tightening the brush by the insertion of the handle, carpet-brooms and birch-brooms resemble, on a larger scale, this kind of brush, to which, to distinguish them from name of *brush*, with some prefix descriptive of size o is especially applied.

Intermediate between what we have distinguished and compound brushes are a kind used by house-pain plasterers under the names of *stock-brushes*, or white distemper brushes, which may be described as cons two, three, or more simple bristle brushes placed side and secured separately upon the edge of a flat b stock or handle, each brush or tuft being divided semicylindrical portions, which are separated suffici admit the thin edge of the stock between them.

Of compound brushes, which consist of numerous pencils of bristles or fibres, technically called *knots*, separately in holes bored in a stock or back of wood materials, there are two principal classes, distingu the mode in which the knots are inserted and secure holes which receive the knots are, in both kinds, usu in a lathe contrived for the purpose, in which the m axis to which the boring tool is fixed, projects in a d from the operator, and forms a right angle with, inst in the common lathe, lying parallel to, the front of t The former practice, which is still occasionally reso boring the heads or stocks of large brooms, was to holes with a bit and brace, the stock being, during t tion, firmly secured in an apparatus attached to t The holes are bored just as deep as it is intended to knots; and where bristles are intended to radiate out from the stock, they are bored at such an angl face as to give the required obliquity. In many case the face of the stock is curved or otherwise shaped ance with the intended spread or splay of the brus though the bored holes may not be parallel with e they may all be at right angles with the surroundi of the stock. The mode of making and fixing th knots in the kind of brush the manufacture of which pan-work or set-work, is as follows:—In making brushmaker takes in his hand, and arranges by stri ends on a board or piece of marble, usually terme board, until the end of the bundle presents an even sufficient quantity of bristles to form a knot or tuft just enter one of the holes in the stock. Grasping th with the fingers near the end which has been struck dips that end into a pan of melted pitch, which, wh sary, is tempered with tallow or oil, and then scrap superfluous pitch by passing the tuft across the edge scraper; an action which also tends, by momentaril or flattening the bundle of bristles, to make the pi trate into the heart of the knot. He then takes a strong thread called a *thrum* (usually one of the refu a weaver's warp-threads, which, being short, would for any purpose in which more than a few inches is required), and quickly and securely ties and bind the bristles. The end of the knot is then again dip pitch, after which it is inserted in its proper hole in with a peculiar twisting or screwing motion, which with the almost instantaneous setting of the pitch, very firm and secure. In this way are manufactu brooms, bannister-brushes, hearth-brushes, and ma kinds of house-broom, and also many of the lighte brushes, such as the dusting-brushes used for picture niture, which are technically called *set dusters*, to d them from the house-painters' dusters above describ

In most of the brushes hitherto described the b used of their full length; or, if not so, the points, the term employed in the trade, the *flags* of the b presented outwards, and are either left uncut, or little, where it is necessary to trim the ends in order t the appearance of the brush. In such brushes howe used rather for what would be generally termed br scrubbing, than for laying on colour, dusting, or much greater stiffness is required, to obtain which or knots must be made short and cut at their ends t even surface, and the root ends of the bristles must be the surface as much as possible, instead of the flag or t Clothes-brushes and some other brushes of this cha or have been occasionally made by the process last which, for fine work, may be varied by the use kinds of cement in lieu of pitch; but by far the m practice is to form all such stiff and short-haired the process of *drawing*, by which all kinds of bru prised in our remaining genus of compound brushes factured.

he stock of a drawn brush is bored in a similar manner to of a set brush, excepting that, to enable the operator to the holes with greater accuracy, both as to their relative tion and the angle they may be required to make with the ce of the stock, and at the same time to enable him to ed the more rapidly with his work, the stock is, during peration, attached by clamps to a ready-bored pattern of wood, the holes in which, though somewhat larger than e required in the stock, are arranged precisely in the de- position, and, when any of the knots are to be inserted inclined position, with the required degree of obliquity. pattern, however, is not used for boring the holes for inserted in an oblique position upon bevels formed upon edge of the brush, such holes being bored by the eye like stocks of set brushes. After each knot-hole has been thus d into the stock just as far as the knot is intended to go, no farther, a smaller boring instrument, called a *bore-gh-bit*, is fixed in the lathe, and with it a small hole is completely through the stock, in continuation of each hole. The brush-maker then, instead of taking in his as many bristles as will fill the hole, takes about half number, and passes a portion of their root ends, of a h somewhat exceeding the intended length or projection he tuft, through the bight or loop of a fine and flexible which, with the other hand, he has passed double gh the stock from the small hole which penetrates it. ng done this, he gives a smart pull to the wire, the effect hich is to pull it back through the hole so far as the or tuft of bristles will allow it to come, the knot itself g, at the same time, drawn into a bight or double, which s the hole in the stock, and is drawn in until stopped by houlder which is formed at the termination of the larger and commencement of the smaller hole produced by bore-through-bit. Passing his wire, which is almost as e as thread, through the next hole, the workman applies er knot in like manner, and so on until a row is com-d, when he cuts the ends of the whole row off with a of powerful shears, to which is attached by screws a e to regulate the precise length of tuft to be left. If the ing has been skilfully performed, the shears will take off or nothing from the roots of the bristles, but the pieces f from the flag ends are, in many cases, long enough to a fresh series of knots. As these are inferior in strength e knots formed of the root ends, they are either used for r brushes, or are worked up in a row of knots just the edge of the brush, where, having the heart or e of the brush on one side, and the outermost row of on the other side, of root-ends, to protect them, they mewhat shielded from wear. As the drawing-wires at ck of the stock would, if exposed, hurt the hand and be liable to injury, it is usual to cover them, even in the oner kinds of brushes, with a thin piece of wood as a er. In scrubbing-brushes, which are much exposed to ure, the wire soon gets corroded and broken, in spite of precaution; but if the drawing has been properly per-ed, the knots will be so tightly secured in their holes as o give way, even after the destruction of the wire, unless brush be allowed to get too dry, so that both the stock the bristles shrink. Drawn brushes comprise, together many other varieties of brush, all kinds of scrubbing-hes, shoe-brushes, clothes-brushes, and tooth and nail-hes, although, from their small size and the greater ness required in their workmanship, the latter form a nct branch of the manufacture. As veneering would be ficult operation to perform upon tooth-brushes, these and r small brushes mounted in bone or ivory are frequently wn with silver wire, which is either left visible, or sunk in grooves cut in the back of the brush, which are after-ds filled up with a hard red cement; but in the best sorts ry ingenious process called *trepanning* is substituted for ordinary mode of drawing. In trepanned work the wing holes are not continued through to the back of the k, but are formed laterally in its thickness, from the end ides, in such a way that after the drawing, which is then formed with thread or silk instead of wire, is completed, traces of the operation can be concealed by filling up a minute holes in an unconspicuous part of the stock with ll plugs of bone or ivory.

he operation of drawing, in the larger and coarser kinds ork, requires great strength of hand and arm, and is per-ned by men, who, in the most approved mode of proceed-, have the stock held fast in a vice, while with the left hand y gather up and apply the bristles, and with the right hand, which is protected from injury by a leather shield, they work and pull the wire. Some workmen use no vice, but hold the brush between their body and the front of the bench, but this is a most injurious, and, for short brushes, also a very inconvenient practice. In the finer kinds of brush-drawing, in washing and picking the bristles, and in various operations connected with the manufacture of fancy brushes, women are extensively employed; and as the manufacture is one usually conducted upon rather a small scale, so as to partake of the character of a private or domestic manufacture, it appears to be well adapted for the employment of females and children.

There are a few other kinds of brush, such as bottle-brushes, which consist of tufts fixed so as to radiate from a stem of twisted wire, which it is needless here to particularize. Dr. Ure, in his 'Dictionary of Arts,' p. 196, describes a new mode of fixing the knots or tufts of brushes in dovetailed grooves formed in the stock, which was the subject of a patent granted in 1830 to Mr. Mason; but as the plan has not, we believe, realized any decided advantage, it does not claim further notice here. More recently a patent has been obtained by Mr. Hancock for the manufacture of flexible back brushes, in which the knots are attached to yielding backs of leather instead of wooden stocks, and for some purposes such brushes seem to possess considerable advantages over those of the common construction.

Of the materials employed in the brush manufacture the most important are hogs' bristles, of which a very large quantity is imported, chiefly from Russia and Poland. As taken from the animal they consist of various colours intermixed, but before use, and in some cases before importation, they are sorted by hand into the several varieties of colour termed in the trade black, grey, yellow, white, and *lilies*, which are the lightest of all; but, excepting in the case of lilies, a bundle of any one of these kinds will be found to contain many shades or varieties of colour, which are carefully intermixed in the process of dressing whenever it is intended to use them together. In *dressing*, the bundle is repeatedly opened and combed with an instrument resembling a wool-comb, and, when a further separation of tints is not intended, the darker and lighter bristles are distributed as equally as possible among one another by separating and doubling the bundle. In all those operations the root-ends are carefully kept together, and in the dressing the bristles are separated into lots according to their length. If intended for fancy purposes requiring great neatness, the dressed hairs are subjected to the process of *picking*, which is frequently performed by children, in which every hair that differs much in colour from the mass is picked out by hand. Some bristles are also scoured or bleached, by which process they may be rendered almost perfectly white. An ornamental appearance is often produced by the insertion, in one brush, of knots of picked bristles of various colours; and it is a common practice to put white or yellow bristles at the outside of a brush intended to look neat, while the centre is filled with those of a dark colour. For very soft brushes, such as hat-brushes, horse-hair, goats'-hair, and other kinds of hair are used, and for purposes which require unusual stiffness, fibres of whalebone, either alone or mixed with bristles, are sometimes employed, though the present high price of that material restricts its use. For very coarse brooms, for stable and out-door use, a hard and tough dark-coloured vegetable fibre called *bass* is much used, brooms made of it superseding, in a great measure, those of birch or heath. *Wisk* is a light-coloured vegetable substance of much finer quality, used principally for carpet-brooms, and a very fine article of the same character has been recently employed in making brushes for velvet. The woods chiefly used for the stocks of the common kinds of drawn brushes are beech and oak, and among those employed in ornamental articles are sycamore, lime, rosewood, and satinwood. For brooms, in which lightness is desirable, alder and birch are much used. The wire employed for drawing is mostly a peculiar kind of brass wire made for the purpose, copper having been found too brittle; but a very superior article of compound metal, which has much the appearance of copper, but is very strong in proportion to its extreme tenuity, and soft and pliable to a degree which appears surprising in any metal, has recently been introduced under the name of red brass wire.

BRYUM, a genus of plants belonging to the natural order of Mosses. It has a terminal footstalk; double peristome, outer one of 16 teeth, inner one of a membrane cut into 16 equal segments with filiform processes often placed between them; the calyptra dimidiate. The species of this genus are exceedingly numerous. They are found in great abundance in Great Britain. . They are all very small, produce a large number of capsules, and are found growing in wet places. They resemble forests of larger plants in miniature. In *B. palustre* are found terminal capitular bodies which resemble what are called the anthers of *B. Androgynum;* but in *B. palustre* they are considered gemmæ, and arise not only from the main stems, but also from the innovations.

(Loudon, *Encyclopædia of Plants.*)

BUCKLANDIA, a liliaceous (?) fossil plant from the Stonesfield oolite.

BUDDLEA, a genus of plants named after Adam Buddle, a botanist of the time of Ray, who contributed to Ray's 'Synopsis,' and whose Herbarium is now in the British Museum. Buddlea belongs to the natural order Scrophulariaceæ. It has a campanulate 5-toothed calyx; tubular corolla with the limb 4-5-cleft, equal, spreading; 4-5 stamens nearly equal, inclosed, the anthers composed of two parallel distinct cells; the stigma clavate, 2-lobed; the capsule crustaceous with a dissepiment formed from the inflexed edges of the valves, inserted in the thick spongy placenta; the seeds angular; testa loose, membranous; albumen fleshy. The species are shrubs, with mostly quadrangular branches, opposite leaves; terminal, capitate, spicate or panicled, usually orange-coloured flowers.

B. globosa has branches clothed with hairy tomentum, as well as the under sides of the leaves; the leaves lanceolate, acuminate, petiolate, crenate; the heads terminal, globose, pedunculate. This plant, now so common in our gardens, is a native of Chili.

B. Americana, branchlets clothed with hairy tomentum, leaves ovate, acuminate, narrow at the base, crenate, rather pilose above, but clothed with a yellowish tomentum beneath; spike panicled, flowers glomerate. It is a native of the mountains of Peru, and also of the West Indies. Browne says that it is used in Jamaica as an emollient. Its properties however are not active.

There are about sixty species of Buddlea, all of which are worth cultivating on account of their showy blossoms. *B. Neemda*, a native of the peninsula of India, is said to be one of the most beautiful plants of that country. The *B. globosa* will bear with a little care our winters, as well as the *B. salvifolia*. All the flowers are sweet-scented. They grow best in a light rich soil. Cuttings will strike readily in mould under a hand-glass. Those of the stove species require heat.

(Loudon, *Encyclopædia of Plants;* G. Don, *Gardener's Dictionary.*)

BUDE LIGHT is a flame producing a strong illumination, and is now the means extensively employed in lighting churches and other great buildings. Originally it was obtained from an oil-lamp, the flame from which was acted on by a current of oxygen gas: subsequently oil-gas was substituted for the liquid oil; but now the gas which is made for lighting the streets of towns is employed to produce the flame, and the brilliancy is increased by a current of atmospherical air ingeniously introduced. This is designated the Atmospheric Bude Light, and it is the result of numerous experiments made by Mr. Goldsworthy Gurney, of Bude in Cornwall, who is also the inventor of the oxy-hydrogen light which is used with the microscope of that name.

The apparatus being suspended from the ceiling, the gas, either as it comes from the street or purified by chemical processes, passes up a number of short tubes into concentric annular receivers, the upper surfaces of which are pierced on the whole of their circumferences with many small holes. On issuing from the perforations the gas is ignited, and thus there are formed as many cylinders of flame as there are rings; while between and round the exterior of the cylinders the atmospheric air rises from below to support the combustion: a hollow frustum of a cone, of glass, open at both extremities and having its greatest end downwards, surrounds the tubes above mentioned; its lower part resting on the base of the framework within which they are suspended, and its upper part approaching very near the bottom of the flame, so that the atmospheric air in rising is confined between the upper or smaller end of the cone and the flame. The distances between the cone and the rings, and between the rings themselves, are regulated by experiment so that the quantity of air may suffice to bring the temperature of the gas to exactly the degree necessary for causing a separation of the charcoal from the flame, as nearly as possible at the moment that the latter issues from the perforations: the flame from each interior ring serves to augment the heat of that which is on the exterior of it, by which means an increased
of light in each is produced; and almost the wh
light which emanates from the interior rings pass
the flame on its exterior, into the apartment.

A cylindrical glass chimney rests at its lower ext
the margin of a circular aperture in the middle of
disk of iron, from 18 inches to 2 feet in diameter,
surface of which serves as a reflector: this disk, an
the chimney, is capable of being raised or lowered,
of adjusting screws, till it conceals the upper ext
the flame; and thus the latter presents the appea
brilliant zone of white light, which is from three inc
inches high, according to the pressure of the gas.

A machine of this kind supersedes the employmen
separate lamps; and, being placed at a considera
from the floor, it is possible to apply above the glas
a pipe which, while it conveys the impure results of
bustion through the ceiling, may serve to ventilate
ing or apartment.

Equal intensities of light may be produced by
apparatus at about one-third of the expense of com
about one-ninth of the expense of composition cand
about one-eleventh of that of wax candles. The B
produced from coal-gas, began to be used for lig
House of Commons in the year 1842.

BUFFALMACCO, an old painter of Floren
beginning of the fourteenth century, and a scholar
Tafi, celebrated for his humour by Boccaccio and
and for his ability by Ghiberti and Vasari. Th
Buffalmacco appears to have been a nickname as gi
by Boccaccio: his real name is said to have been
di Cristofano, but some have supposed the name of
which is used by Ghiberti, to have been a nick
Rumohr and others have even doubted his actual
supposing that Vasari himself has given him his
existence by confounding together the real Bu
Ghiberti and the imaginary Buffalmacco of Bo
idea which does not seem to have occurred to e
nucci or Lanzi, or any of the Italian editors of Va
This however is certain, that Vasari has gleaned
interesting and all that is amusing in his Life of
from the novels of Boccaccio and Sacchetti; and
narrations of the ready humour of this painter ar
amusing passages in his Lives: they are from the
novels of Boccaccio:—'Decamerone,' viii. 3, 6, 9
and the following of Sacchetti—161, 169, 191, 19

Vasari enumerates many of Buffalmacco's works,
however scarcely anything now remains. Of those
to him there are still some in the Campo Santo at
Arezzo. At Pisa there is a Creation of the Uni
stories from the life of Noah and his sons; and
fixion, the Resurrection, and the Ascension of C
though there is some meaning in them as comp
designs they are barbarous works; they are engrav
nio's 'Campo Santo.' Vasari however speaks of o
which have perished as very superior to these, a
that Buffalmacco, when he chose to exert himself,
not often, was equal to any of his contemporaries.
his works in Pisa he was assisted by Bruno di Gio
is also mentioned by Boccaccio. On the picture of
tion just mentioned, there is a sonnet which
copied into his book, and which, in the opinion of
of the Roman edition of Vasari, proves that Buffal
a much better poet than he was a painter. He
according to Vasari, in 1340, aged seventy-eight,
ing to Baldinucci he was still living in 1351; he
fore probably a younger painter than Giotto, wh
1336, aged sixty, though Vasari's account makes B
the elder.

(Vasari, *Vite de' Pittori*, &c.; Baldinucci, *Notiz*
fessori del Disegno, &c.; Lacinio, *Pitture a*
Campo Santo di Pisa.)

BUFFO'NIA, a genus of plants named in honou
de Buffon, the celebrated French writer on natu
belonging to the natural order Caryophyllaceæ, an
order Alsineæ. The calyx has 4 sepals; the pe
entire; stamens 4; styles 2; capsules compressed
2-valved, 2-seeded. The species are insignificant sle
resembling the species of Arenaria. *B. annua* is a na
south of France, and is said to have been found i
on the sea-coast of Lincolnshire.

(Babington, *Manual.*)

BUFONITES (in Palæontology), the term co l, previously to the investigations of M. Agassiz, to the dish teeth of fishes, frequent in the oolitic strata. They ng to the genera Sphærodus, Gyrodus, Pycnodus, &c.

UILDING, or the art of constructing edifices, is defined ome writers as practical, in contradistinction to theoretical, itecture; but, without a previous explanation of the mean- of the term architecture, such a definition is imperfect, , although building is necessarily included or involved in execution of all architectural works, many of the works uced by the builder have either no claim at all, or a by no means generally admitted, to be considered archi- ral works. In the practice of civil architecture, the er comes between the architect who designs the work the artisans who execute it; and, in a commercial point iew, between the party by whom the capital is provided e one hand, and the merchants and manufacturers who ide the necessary materials, and the workmen whose e it is to shape and unite them, on the other. For the porary employment of his own capital and the exercise of directing skill, he is usually remunerated by charging his loyer for labour and materials at a higher rate than he has himself; and, for the mutual security of all parties, he erally works by contract, either undertaking to execute building, with all contingent works, for a given gross , which is termed a lumping contract, or agreeing to per- the whole work at certain specified rates per yard, rod, , &c., according to the nature of the work, the quantities g measured according to established rules.

n article upon the multifarious operations connected with ding would not only require more space than is consistent the plan of this work, but would also involve the repeti- of much information already given under various heads. a general treatise is supplied in the long and elaborate le 'Building,' in the new edition of the *Encyclopædia itannica*, contributed by Mr. Hosking; a treatise which be consulted with advantage by readers who wish to go fully into the subject. Here we propose to do little e than give such an outline as may enable the reader to readily to those portions of the work in which the various nches of the general subject are treated of.

Of the distinction between building, properly so called, and hitecture, some account is given, together with remarks on most antient styles of building, in the article ARCHITEC- , P. C., p. 282; and under HOUSE, P. C., p. 323, the ject of domestic architecture, which it is all-important for ilder to be well acquainted with, is treated at some length. m the last-mentioned article it will be evident that the ntion of the builder should be directed rather to matters of ity and comfort than to such as relate to ornament; ough, as many houses are erected without the aid of a essed architect, it is desirable that he should be so far ainted with the principles of architectural design as to d displeasing proportions and incongruity of ornament. re the choice of site remains with himself, he should d a low and damp situation, and also a situation exposed old winds. A good supply of water to the house, and cient fall to ensure perfect drainage, are essential; and as neral rule, the advantage of southern and western front- should be secured as much as possible. The direction the prevalent winds is a point to be carefully considered, rder that the openings of doors and windows may be so nged as to avoid drafts and smoky chimneys, which are unfrequently occasioned by want of due attention to this tter. [SMOKE, P. C., 155.] Such points being duly con- ered, drawings of the intended building, showing not only exterior form, but also its interior arrangements and the stance of its walls and partitions, as explained under DE- , ARCHITECTURAL, P. C., p. 437, are prepared; after ich the actual construction commences by the preparation a firm foundation for the structure, as described under UNDATION, P. C., p. 383. The excavation formed for the ndation should be executed with the utmost care, and the el must be produced by the removal of earth until an even is produced; the production of a level by filling up with loose materials is extremely hazardous. For le of laying foundations under water see COFFERDAM, p. 324.

articles BRICKWORK, P. C., p. 410, and MORTAR, p. 419, contain information on the construction of brick ut the provisions of the new Metropolitan Buildings Act, of which an abstract is given in the next article, render ecessary to substitute for the directions given under BRICK- ORK, relative to the thickness of walls, the following new regulations for the thickness of external and party walls of dwelling-houses. First-rate buildings, which are such as range from 70 to 85 feet in height, cover more than ten and not more than fourteen *squares*, or areas of 100 superficial feet, or contain seven stories, including the basement, are to have their external walls at least 21½ inches thick from the top of the footings of the foundation 'up to the under side of the floor next but three below the topmost floor,' that is to say, in a seven-story house, the full height of the basement and the next story above it. From this point 'to the under-side of the floor next below the topmost floor,' a further height of three stories, the thickness is to be at least 17½ inches; and the remainder of the wall to the top at least 13 inches. In a building of this kind the requisite thickness of the party walls is precisely the same as that of the external walls; but in buildings exceeding 85 feet in height, covering more than fourteen squares, or containing more than seven stories (which buildings are considered as extra first-rate), the thickness of 21½ inches is to be carried up to the floor next but two below the topmost floor, and that of 17½ up from that point to the top of the building, in the external walls, and the party walls must be at least 21½ inches thick from the footing to the floor next but three below the topmost floor, 17½ inches from this point to the under side of the topmost floor, and 13 inches from the topmost floor to the top of the wall. Second-rate buildings, which are such as range from 52 to 70 feet in height, cover from six to ten squares, or contain six stories, must have both the external and the party walls at least 17½ inches thick from the footing to the under side of the floor next but one below the topmost, and 13 inches above that point to the top. Third-rate buildings, or such as range from 38 to 52 feet in height, cover from four to six squares, or contain five stories, must have their external walls at least 17½ inches from the footing to the floor next but two below the topmost floor, and 13 inches thence to the top of the wall, and their party walls the same, excepting that from the top-most floor to the top of the wall the substance may be further reduced to not less than 8½ inches. Fourth-rate buildings, or such as do not exceed 38 feet in height, do not cover more than four squares, or contain more than four stories, must have their external walls at least 13 inches thick from the top of the footing up to the under side of the floor next below the topmost, and at least 8½ inches thence to the top of the wall, while the party walls must be at least 13 inches up to the floor next but one below the topmost, and 8½ inches above that point. Thus a four-story house, if not exceeding 38 feet in height, or covering more than four squares, must have its external walls 13 inches thick for the full height of the basement story and the next story above it, while in the party walls that thickness need not be carried up beyond the top of the basement story. The above regulations relate only to dwelling-houses, which are considered buildings of the first class; distinct regulations being provided for buildings of the second or warehouse class, which comprises, besides warehouses and storehouses, granaries, breweries, distilleries, manufactories, workshops, and stables, and for buildings of the third or public building class, which includes churches, chapels, colleges, halls, hospitals, theatres, public concert, ball, lecture, and exhibition rooms, and all places used either temporarily or permanently for the assemblage of persons in large numbers. Buildings of the second class are divided into four rates, according to their height; those exceeding 66 feet being deemed first-rate, those from 44 to 66 feet second-rate, those from 22 to 44 feet third-rate, and those not exceeding 22 feet fourth-rate. First-rate buildings of this class must have both the external and party walls at least 26 inches thick from the top of the footing to within 76 feet of the height of the topmost ceiling, 21½ inches from that point to within 36 feet of the topmost ceiling, and 17½ inches above that point to the top of the wall if it be an external wall, though in the case of a party wall the thickness may be further reduced to 13 inches above the level of the topmost ceiling. Those of the second-rate must be, whether external or party walls, 21½ inches thick to within 58 feet of the topmost ceiling, 17½ inches to within 22 feet of the same, and 13 inches above that point. Those of the third-rate must have their external walls of the thickness of 17½ inches to within 28 feet of the top-most ceiling, and 13 inches above that point; the party walls being the same, excepting that above the level of the topmost ceiling they may be reduced to 8½ inches; and those of the fourth-rate must have their external walls 13 inches thick to within 9 feet, and the party walls of the same thickness to within 16 feet of the topmost ceiling, the upper portion of the wall, in each case, being at least 8½ inches thick. The substance or thickness of the walls of buildings belonging to the third or public class is to be computed by reference to the rate of such buildings of either the first or second class as they may most nearly resemble, four inches being in every case added to the thickness directed for such first or second class building, and special cases being dealt with by official referees appointed under the Building Act. [BUILDING, ACTS FOR REGULATING, P. C. S.] It should be observed respecting the provisions above quoted, that it is usual to make the outer face of an external wall vertical, whatever may be the changes introduced in the thickness of the brickwork. Wherever a change is made in the exposed face of a wall, the projecting ledge or set-off thereby produced should be finished with a stone string-course, to answer the purpose of a coping.

The various modes of bonding brick walls are sufficiently described in BRICKWORK, P. C., but these relate simply to the mode of arranging the separate bricks or component parts into a solid and cohesive wall or mass of brickwork. Much more than this, however, is required in building the walls of a house, in order to prevent, as much as possible, their strength from being impaired by the necessary openings for doors and windows, and to afford the means required for connecting the door and window frames, floors, partitions, and other woodwork, with the shell of the structure. The effect of apertures in a wall is counteracted by the introduction of inverts, or inverted arches, in the portion of wall beneath them, and of discharging arches, which may either be left visible or not, over them. The fixing of door and window frames, and other small woodwork, is provided for by the insertion in the wall of *wood-bricks*, or blocks of seasoned wood resembling bricks in form and size. *Lintels* are bars of wood inserted, in lieu of arches, over the apertures of doors and windows, but they should always be surmounted by discharging arches abutting upon the solid brickwork beyond the ends of the lintel, which, in such a case, may be made to tail into the wall to a very short distance only beyond the sides of the aperture. Where, however, there is to be no discharging arch over the lintel, it should be of sufficient length to tail considerably into the wall, and its ends should rest upon transverse templates or wood-bricks built into the wall. *Templates* are pieces of timber often three or four feet long, which are let into the wall after the manner of wood-bricks, either for the purpose of fastening to, or to support the ends of beams let into the wall, and distribute their pressure over a considerable space. Discharging arches should be turned over these, and over the ends of beams, so that their shrinking, or even their decay or destruction by fire, should not be sufficient to affect the stability and cohesion of the wall. Some floors are so framed together that they may be connected with the walls by a few principal beams, the ends of which rest upon templates; but more usually the ends of the joists rest upon long pieces of timber called *wall-plates*, which are let into the brickwork, and serve to distribute the weight equally. *Bond-timbers* are occasionally inserted with a special view to the distribution of strain, but their liability to swelling and shrinking, as well as their perishable and combustible character, render it desirable to bond the structure as perfectly as possible without them. Timbers should, in all cases, be kept clear of the chimney-flues, or, if this be impossible, should be guarded with iron so as to prevent the possibility of a spark coming in contact with them. The various plans which have been introduced of late years for securing timber from the ravages of dry-rot, and rendering it incombustible, greatly lessen the risk of employing it in walls. [TIMBER, PRESERVATION OF, P. C. S.] The variations of size occasioned by changes of temperature render the combination of iron with brickwork even more hazardous than the use of timber, though the employment of straps of hoop-iron laid in the mortar between the courses of bricks is found advantageous under certain circumstances. An instance of its employment in the construction of arches without centreing is mentioned under SCAFFOLDING, P. C., p. 499. The brittleness of cast-iron renders it very unfit for use where unequal settlement may occur. The construction of efficient drains should be attended to in an early stage of the building. This subject is fully treated under SEWERS, P. C., p. 314, and it is only necessary here to observe, that in order to increase the current and prevent the deposit of sediment, all drains should be concave at the bottom, and that where they pass through houses, or in any case in which it is probable that they may have to be opened, it is desirable to make the top consist of flat paving-stones or tiles, laid in cement; as a circular, barrel, or, as it is sometimes called, a gun-barrel drain, unless its fall
be very considerable, will be likely to involve m
and expense in opening and cleaning. Where th
straight, and short enough to be raked, this matte
consequence. It is a usual and convenient plan
the drain under a doorway, between the sill and t
but when this cannot be done, an arched opening
bull's eye, must be made in the wall where it pass
In addition to the air-traps which, as described unde
should always be placed at the entrance of drain
simple trap may be formed at any convenient poin
course, by sinking a small well a few inches below
of the drain, and building in with the brickwork o
a flat piece of flag-stone in such a manner as to form
valve resembling that shown in SEWERS, *Fig.* 4,
water can escape until the well is filled, and no ai
the trap unless the well becomes, by evaporation,
allow it to pass under the edge of the dipping-valve

As the erection proceeds, contrivances for sup
workmen and materials are required, of which an
given under SCAFFOLDING, P. C., p. 497. Unde
P. C., p. 313, allusion is made to a very convenien
invented by Dr. (there misprinted Mr.) Spurgin, fo
the labour of raising bricks and other materials on t
In the basement story of a building, the partition w
as the external and side or party walls of a house
formed wholly of brickwork, but in the upper stor
generally of lath and plaster, on a framed and tru
foundation, or of what is technically called *bri*
which consists of a framework of quartering, sim
used for lath and plaster, but having the intermed
between the timbers filled up with brickwork, th
a wall either 4½ or 3 inches thick, according to w
bricks are laid flat or on edge. Though strengthe
upright quarterings or timbers, the brickwork, bei
should be strengthened or bonded further by the i
at intervals of not more than six courses, of horiz
wood called *interties*, or *nogging-pieces*, skew-naile
to the quarterings. Some builders, in lieu of brick
half-brick, or 4½ inch, walls carefully built in
strengthened with iron hooping, a plan which has th
of greater security from fire. Such partitions also
effectually than those in which much timber is intr
transmission of sound from one room to another.
of brickwork in internal walls, and in such exter
are to be covered with plaster, stucco, or ceme
rough, with the mortar projecting from the joints.
inequality of surface thus produced causes the plast
better; but in such external walls as are to be
view, the superfluous mortar is removed, and
drawn, by applying the point of the trowel so as t
joint, or rather to leave it slightly concave. The
beds of mortar between the bricks is not only in
the settlement thereby occasioned, but also becau
pression of the mortar causes it to bulge out at the
so to counteract the effect of drawing with the tro
joints, being thus rendered convex instead of con
and absorb the rain which trickles down the wall,
a frost comes this absorbed moisture freezes, and o
mortar to crumble away, thus involving the n
pointing, or filling in the joints with new mortar,
the wall. To do this, the old mortar must be scr
the depth of three-eighths of an inch, or further
and the joints must be thoroughly cleaned and
before inserting the new mortar, which should be
quality. Mortar for this purpose is commonly m
forge ashes, which give it a bluish tinge, and rende
fit to resist injury from weather. Cement is som
for the purpose in lieu of mortar. If the work
to be very neat, each joint is finished with a narr
parallel ridge of fine white putty or mortar, made
of bone-lime. In the application of this kind o
which is termed *tuck-pointing*, to an old wall it is us
and colour the whole surface of the brickwork:
by the carelessness of the bricklayer, the vertical j
should come in a line over each other, technically
perpends, have not been properly attended to, the
joints may be filled up with brick-coloured putty
joints made in the proper places. Mortar used fo
getting, or internal plastering, of brick chimney flu
with a little cow-dung, to prevent its peeling o
heat. The top of a brick-wall, whenever it is n
by the roof, must be protected by coping [COPI
p. 501], which in single-brick walls is often form

row of bricks set on edge in cement across the wall, and
d a *barge-course*, a name which is also given, with more
riety, to the projection of a roof over a gable-end.
ge-Course, P. C., p. 450.] This kind of coping is very
erfect, because, as it has no projection or inclination, it
not throw off the water. It may be improved both in
arance and efficiency by laying underneath the barge-
se two double courses of plain tiles, with their joints
en, and their edges projecting about an inch and a half on
side of the wall, or by a similar application of paving-
Stone coping however, which can be made of any
h, and properly sloped or weathered and throated, is far
er. For ornamental brickwork proper coping-bricks are
e, which if well set in fine mortar or cement may be
lly efficient with stone, and have a better architectural
acter. It may be remarked generally that brick walls
n suffer injury in consequence of the insufficient projection
opings and cornices, which ought to throw off water as
h as possible from the face of the wall.

he established mode of measuring brickwork is explained
r Brickwork, P. C. Brick and tile paving, which are
ed under Floor, P. C. S., are measured by the super-
l yard of nine feet, and tiling, for which see Roof, P. C.,
8, and Tile, P. C., p. 446, by the *square* of 100 super-
feet.

f the use of stone in building some account has been given
r Masonry, P. C., p. 481; Ashler, P. C., p. 451; and
icated Work, P. C., p. 271. Rubble-work is more
lt to execute well than building with cut or squared
s, since there is great danger of trusting too much to the
ar. Unwrought stones, however irregular in shape,
t to be so laid together that the wall would stand if laid
considerable height without mortar. It is of course
able to give the outside of a rubble wall as neat an appear-
as possible; but care must be taken in doing so to bond
facing stones as thoroughly as possible with the centre of
wall, and not, for the sake of show, to expose the bed of
stone, or the flat surface formed by its stratification, in
face of the wall, as a stone so applied cannot be firmly
ed into the wall, and its flat surface is far more liable to
y from the action of the atmosphere than a surface cut at
angles with its plane of stratification. It is better to
the wall by means of many stones extending partly
gh its thickness, alternately from each side, than to use
w thorough stones, or stones reaching completely from
to face, and yet leave the greater part of the wall like
hells inclosing an irregular core of coarse rubble. Stone
gs and some other kinds of stone-work are frequently
ped together with fastenings of iron or copper, run in
melted lead; but unless these metal fastenings, especially
of iron, can be thoroughly secured from the influence
e atmosphere, they are liable, from oxidation and the
t of changes of temperature, to produce much harm, and
efore it is better, if possible, to use tenons, dowels, joggles,
owels of stone or wood, protecting them also from the
her. An ingenious mode of dowelling, adapted to the
ation of defective arch-stones, is described under Black-
s Bridge, P. C., p. 485. The principal purposes for
h stone is introduced in brick buildings are enumerated
r Masonry, P. C., to which we need only add that the set-
of stone window and door sills is usually delayed as long
ssible, to give the brickwork time to settle, because a very
t inequality in the settlement would cause them to break,
g long and thin. The brittleness of stone, indeed,
ers it always unadvisable to use it in pieces of great length
earing, and very important to make the joints perfectly
n. In the jointing of columns, for example, the ends of
adjacent stones must not be worked hollow, with a view
aking the joint perfect at the edges. A better plan is to
k them flat, and insert a thin sheet of lead between them,
s little smaller than the column itself, thereby leaving a
l open joint all round, to be filled up with fine putty.

e walls are usually measured by the perch of 21 super-
l feet, of an assumed standard thickness of 18 inches, and
efore containing 31½ cubic feet; but sometimes the rod is
as a measure, as in brickwork, assuming however a thick-
of 18 instead of 13½ inches.

ides brick and stone, other materials are occasionally
loyed for the construction of walls, of which we may
e to flints and earth. Houses built of flints, which can
be used to advantage in certain localities where that ma-
l abounds, necessarily depend much for the cohesion of
r walls upon the strength of the mortar, and on the judicious introduction of bonding-courses of brick or larger stone, and of quoins or angles of the same. When well executed, the appearance of flint buildings is far from displeasing, and by a little management of the contrast afforded by the white outside and black centre of the flints, may be made absolutely ornamental. Building with compressed earth, or building *en Pisé*, is a very cheap, simple, and, when properly managed, durable mode of building, which has been long and extensively practised in some parts of France, especially in the neighbourhood of Lyon, and has been adopted in this country not only as a substitute for the rude plan of constructing cabins with mud tempered with straw, and held together by wattles and timber framework, bnt also in lieu of regular brickwork. In vol. xxvii. of the 'Transactions' of the Society of Arts, pp. 185-197, is a minute description, illustrated by a plate of the apparatus employed, of an improved mode of executing this kind of work, invented by Mr. Robert Salmon, of Woburn. The foundations, and the walls to a short distance above the level of the ground, are built of stone or brick, but all the upper part of the walls consists simply of earth, beaten or rammed into a compact mass between two boards, which are fastened in such a position that their inner surfaces correspond with the faces of the wall. The work proceeds in courses, and each course in portions of convenient length; and the boards, which serve as a mould, are so connected by bolts that they may be readily separated from one another, and from the completed portion of wall, and put together again in the required position for forming another portion of wall. The earth is thrown in in small quantities, so that every portion may be very completely beaten, and as it is thrown in, a little is drawn away from the surface of the mould, and its place supplied by a facing composition, consisting of about one-fourth lime and three-fourths of the earth used for walling, mixed together with water and slaked like mortar, but allowed to dry and pulverize before it is rammed in. This facing composition, which is applied about an inch thick, forms a cement-like face to the wall, which preserves the earth from the access of moisture. When the surface of one course of earth has become hard before another is added to it, a little thick grout of lime and earth is added to facilitate the adhesion of the new and old work. Mr. Salmon observes that the earth for this work 'should be neither sand nor clay, but partaking of both.' 'Clay,' he adds, 'is particularly objectionable, as is also chalk or calcareous earth of any sort. Sand is also not proper, unless accompanied with some binding quality: the bolder and coarser the sort of earth the better. When used, it should retain no more moisture than just to make it adhere together under the pressure of the thumb and finger.' Earths containing a mixture of grit or fine gravel he considers generally the best. Bond-timbers, wall-plates, and all other pieces of wood inserted in the walls, are kept as thin as may be, to avoid disagreement from shrinkage; and doorways and openings for windows may be conveniently formed by the insertion of temporary frames of stout planking, against which the earth is rammed as against the mould. In this mode of building labour forms the most important item of cost. At Woburn, with labourers at 1*s*. 10*d*. per diem, Mr. Salmon found the expense of a 16-inch wall to be about 2*s*. 8*d*. per superficial yard if faced and finished on one side only, and 3*s*. 4*d*. per yard if faced and finished on both sides; while the value of a superficial yard of brickwork, 14 inches thick, would have been more than 10*s*. at the same time and place. The walls may be finished externally by lime-washing, and, if intended to look very neat, wetting and rubbing the surface with a plasterer's float, until it is smooth and even. A full account of the French mode of executing this kind of building is given in the sixteenth volume of the 'Dictionnaire Technologique' (8vo., Paris, 1829), art. 'Pisai, Pisè,' and in a briefer notice in the fourth volume of the 'Dictionnaire de l'Industrie' (8vo., Paris, 1795), article 'Murailles Economiques,' are some remarks respecting the meaning of the term *Pisé*, or, as it is sometimes written, *Pisè*. If the projection of the roofs be sufficient, and other precautions are taken to keep the walls dry, buildings of this character may be safely constructed of two or three stories in height, and they will prove very durable, many such buildings in France having stood more than a century without any symptom of decay.

Respecting the means of protecting walls from damp, whether arising from the foundation or not, some information is given under Asphalte, P. C. S., p. 144. Double walls, in which a space is left between the external brick or stone wall, and the lining of the room, of whatever kind it may be, are sometimes resorted to as a means of preventing the passage of damp, and a simple mode of producing the same effect, which answers well when great strength is not required, is accomplished by the use of bricks laid on their edges instead of their flat sides. In a single brick or 9-inch wall of the ordinary construction there are no hollow spaces, because, the bricks being laid flat, the width of two stretchers, being 4½ inches each, is exactly equal to the length of the headers, that is to say, 9 inches. If, however, the bricks be laid on edge, but otherwise disposed in the same way, while the headers are, of course, of the same length, the width of the stretchers will be only 3 inches each, so that if they are laid to the face of the wall they will leave an intermediate space of 3 inches. Of course a less number of bricks will be required to produce an equal surface of wall by this than by the ordinary mode of laying.

Of the various departments of building relating to Carpentry and Joinery brief notices will be given under those heads in P. C. S., with references to the various articles relating to them in P. C. Here it is only needful to observe that the portions of a building supplied by the carpenter should be so contrived as to strengthen and bind together the whole structure. The Roof, especially, of which a full account is given under that head in P. C., should contribute greatly to the solidity of the building, as well as answering the primary purpose of a covering. In London houses, owing to the great value of space, sleeping-rooms are very often formed in roofs; and in certain cases, when the ridge of the roof is made parallel to the front of the house in order to secure as much internal space as possible, the front gutter is connected with that at the back of the house by a covered trough passing through the apartment formed in the roof, so that although the fall of water from the roof may be equal towards the front and back, the pipes for conducting the water to the ground may be confined to the back of the house. The provisions of the New Building Act respecting such rooms are alluded to in the next article. For the external covering of walls in which the brickwork is coated by a stone-like composition, see Stucco, P. C., p. 166; and for the lining of walls, the formation of ceilings, &c., see Plastering, P. C. S. Internal decorations are treated of under Painting, House, P. C., p. 145, and Paper Hangings, P. C., p. 215. More specific information respecting the various parts of a building will be found in such articles as Staircase, Door, Window, Arch, and Dome, in P. C., and Chimney, in P. C. S.; and under Fireproof Buildings, P. C. S., will be noticed some important deviations from the ordinary mode of building, in order to diminish the risk of fire.

BUILDING, ACT FOR REGULATING. Provisions for regulating the construction of buildings are generally introduced into acts for the improvement of towns. To permit houses of wood or thatched roofs in confined and crowded streets, would be to sacrifice the public welfare to the caprice or convenience of individuals. There is no general measure ensuring uniformity of regulations for buildings throughout the country. In the session of 1841 the Marquis of Normanby, then a member of the government, brought in a bill 'for the better Drainage and Improvement of Buildings in large Towns and Villages,' but it did not pass; and a bill of a similar nature was unsuccessful in the session of the following year. In the session of 1844, however, an act was passed (7 & 8 Vict. c. 84) entitled 'An Act for Regulating the Construction and the Use of Buildings in the Metropolis and its Neighbourhood;' and this measure, though applicable at present only to London, promises to be an important step towards improving the condition of large towns, and with certain modifications it will probably be extended to other places. The act came into operation on the 1st of January, 1845. London has had Building Acts ever since the reign of Queen Anne; but their object was chiefly to enforce regulations calculated to check the spread of fire. The last Building Act, commonly called Sir Robert Taylor's Act (14 Geo. III. c. 78), was passed in 1774, 'for the further and better regulation of buildings and party walls, and for the more effectually preventing mischiefs by fire." It extended to the cities of London and Westminster, and their liberties and other places within the bills of mortality, and to the parishes of St. Marylebone, Paddington, St. Pancras, and St. Luke's, Chelsea. The administration of the act was confided to district surveyors, each of whom had independent authority within his own district; but the magistrate at the nearest police-office might enforce or not, at his own discretion, decisions of the surveyor. The technical regulations of act were many of them, generally speaking, of so impractica a nature that their evasion was connived at by the officers pointed to superintend the execution of the law; and it nothing to discourage the erection of imperfect buildings districts which have become a part of the metropolis sin was passed. Whether the new act (7 & 8 Vict. c. 84) tains regulations equally impracticable remains to be Some of them probably are of this nature, as may be expe in attempts to legislate on technical matters of detail; but object of the act is excellent, and any defects in carrying out may be corrected without much difficulty. The remo of sources of danger and disease in crowded neighbourhoo by enforcing ventilation and drainage, and by other mean in itself both wise and benevolent. The window tax prove a great impediment to the act being fully carried out several respects.

The objects of the Metropolitan Buildings Act may be thered from the preamble, which is as follows:—'Whe by the several acts mentioned in schedule (A.)* to this annexed provisions are made for regulating the constructio buildings in the metropolis, and the neighbourhood ther within certain limits therein set forth; but forasmuch as b ings have since been extended in nearly continuous lines streets far beyond such limits, so that they do not now in all the places to which the provisions of such acts, accord to the purposes thereof, ought to apply, and moreover provisions require alteration and amendment, it is expedi to extend such limits, and otherwise to amend such acts: forasmuch as in many parts of the metropolis and the ne bourhood thereof, the drainage of the houses is so imper as to endanger the health of the inhabitants, it is expedien make provision for facilitating and promoting the improvem of such drainage; and forasmuch as by reason of the narr ness of streets, lanes, and alleys, and the want of a thorou fare in many places, the due ventilation of crowded ne bourhoods is often impeded, and the health of the inhabit thereby endangered, and from the close contiguity of the posite houses the risk of accident by fire is extended, it is pedient to make provision with regard to the streets and ways of the metropolis for securing a sufficient width ther and forasmuch as many buildings and parts of buildings for dwellings are used for that purpose, whereby disease is gendered, fostered, and propagated, it is expedient to dis rage and prohibit such use thereof: and forasmuch as by carrying on in populous neighbourhoods of certain works, which materials of an explosive or inflammable kind are the risk of accidents arising from such works is much incre it is expedient to regulate not only the construction of buildings in which such dangerous works are carried on, also to provide for the same being carried on in buildings safe distances from other buildings which are used either habitation or for trade in populous neighbourhoods; and asmuch as by the carrying on of certain works of a kind, or in which deleterious materials are used, or dele products are created, the health and comfort of the inhabit are extensively impaired and endangered, it is expedien make provision for the adoption of all such expedien either have been or shall be devised for carrying businesses, so as to render them as little noisome or dele as possible to the inhabitants of the neighbourhood; and there be no such expedients, or if such expedients be available in a sufficient degree, then for the carrying such noisome and unwholesome businesses at safer dista from other buildings used for habitation; and forasmuch great diversity of practice has obtained among the officers pointed in pursuance of the said acts to superintend the cution thereof in the several districts to which such acts and the means at present provided for determining the rous matters in question which constantly arise tend to mote such diversity, to increase the expense, and to retard operations of persons engaged in building, it is expedie make further provision for regulating the office of surveyo such several districts, and to provide for the appointme officers to superintend the execution of this Act throughou the districts to which it is to apply, and also to determ sundry matters in question incident thereto, as well as to ercise in certain cases, and under certain checks and cont a discretion in the relaxation of the fixed rules, where strict observance thereof is impracticable, or would d the object of this Act, or would needlessly affect with inj the course and operation of this branch of business; now

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* These acts are 14 Geo. III. c. 78, partly repealed; 50 Geo. III. c. 75, wholly repealed; and 3 & 4 Vict. c. 85, repealed so far as it relates to flues and chimneys.

the several purposes above mentioned, and for the purpose
onsolidating the provisions of the law relating to the con-
ction and the use of buildings in the metropolis and its
ghbourhood, be it enacted,' &c.

he principal officers appointed to carry the act into effect
two Official Referees, a Registrar of Metropolitan Build-
s, and Surveyors. The immediate superintendence of
dings is confided by the act to the surveyors, who are ap-
ated by the court of aldermen for each district in the city,
by the justices at quarter-sessions for other parts of the
ropolis. In all cases of dispute or difficulty the official
rees appointed by the Secretary of State and the Commis-
ers of Woods and Forests will determine the matter, in-
d of the appeal being to the police magistrates, as was
erly the case. The official referees are also empowered
modify technical rules. The registrar, who is appointed
the Commissioners of Woods and Forests, is required to
p a record of all matters referred to the official referees,
to preserve all documents connected with their proceed-
s.

he third section of the act defines the limits to which the
hall extend, which are as follows:—'To all such places
on the north side or left bank of the river Thames as are
n the exterior boundaries of the parishes of Fulham,
mersmith, Kensington, Paddington, Hampstead, Hornsey,
enham, St. Pancras, Islington, Stoke Newington, Hack-
Stratford-le-Bow, Bromley, Poplar, and Shadwell; and
ch part of the parish of Chelsea as lies north of the said
h of Kensington; and to all such parts and places lying
e south side or right bank of the said river, as are within
xterior boundaries of the parishes of Woolwich, Charlton,
nwich, Deptford, Lee, Lewisham, Camberwell, Lam-
Streatham, Tooting, and Wandsworth; and to all places
within two hundred yards from the exterior boundary
district hereby defined, except the eastern part of the
boundary, which is bounded by the river Lea.
§ 4 power is given to the queen in council to extend
ove limits to any limits within twelve miles of Charing
notice of such extension being published in the 'Lon-
azette' one month previously.
surveyor and overseers of the place in which buildings
uinous state may be situated, are required to apply to
ficial referees to authorize a survey to be made thereof.
of the surveyor's certificate is to be forwarded to the
rs (or to the lord mayor and aldermen, if within the
f London), and they are required to cause such ruinous
g to be securely shored or a sufficient hoard to be put
the safety of all passengers; and they are also to give
to the owner to repair or pull down the whole or part
building within fourteen days. An appeal lies to the
l referees, and if the owner refuses to repair or pull
premises certified to be in a ruinous state, this may be
by the overseers, or in the city by order of the lord
and aldermen; and the materials may be disposed of to
e costs of every description which may have been in-
d; and if any surplus remains, it is to be paid to the
But if the proceeds from this sale of materials are
fficient to cover the expenses, the deficiency is to be
up by the owner of the property, and may be levied
warrant of distress; and if there are no goods or chat-
to levy, the occupier of the premises may be required to
and he can deduct the amount from his rent. The same
which the act directs as to buildings in a ruinous state
also be followed in reference to chimneys, roofs, and pro-
, so far as relates to repairing or making them secure.
projection be from the front walls of any building and
nger of falling, the occupier, or if not the occupier,
owner, may be required to take down or secure the
within thirty-six hours; and a penalty of five pounds
red for every day during which the projection com-
of is allowed to remain unrepaired or in a dangerous

subject of party walls, party fences, and intermixed
is regulated by §§ 20 to 39, and the following pro-
are made as to their reparation, pulling down, or rais-
If the consent of the adjoining owner is not obtained,
must be given to him three months before the work is
enced, and the adjoining owner may obtain an order on
ication to the official referees for such a modification of
work as will render it suitable to his premises. If the
t of the adjoining owner cannot be obtained, the matter
be referred to the surveyor, and the official referees may
ect or confirm his certificate, and award the proportion of expenses, &c. The decision of the official referees is to be final and conclusive.

The 51st clause provides for a proper drainage. Before the walls of any building shall have been built to the height of ten feet, drains must have been properly built and made good leading into the common sewer, or if there be no sewer within one hundred feet, then to the nearest practicable outlet. If there be a common sewer within fifty feet of a new building, a cesspool must not be made without a good and sufficient drain leading to it. A cesspool under a house or other building must be made air-tight. Privies built in the yard or area of any building must have a door and be otherwise properly enclosed, screened, and fenced from public view.

The act also fixes the width of new streets and alleys. Every street must be of the width of forty feet at the least; and if the buildings be more than forty feet high from the level of the street, the street must be at least equal in width to the height of the houses or buildings. Every alley and every mews must be at least twenty feet in width, and if the buildings are higher, the width must be increased in proportion, so as to be at least equal to the height.

The 53rd clause is of great importance in reference to the sanitary condition of the poor. It provides that, from and after July 1, 1846, it shall not be lawful to let separately to hire as a dwelling any room or cellar not constructed according to the rules specified in schedule K, nor to occupy or to suffer it to be occupied as such, nor to let, hire, occupy, or suffer to be occupied any such room or cellar, built under ground for any purpose, except for a warehouse or storeroom. The official referees and the registrar of metropolitan buildings soon after the passing of the act issued forms to the overseers of the poor within their district, in order to assist the parochial authorities in making a return, which was to be ready by January 1, 1845, of all rooms which under the act are deemed unfit for dwellings, but which are now occupied as such. The building regulations contained in schedule K are as follows:—'With regard to back yards or open spaces attached to dwelling-houses, every house hereafter built or rebuilt must have an enclosed back yard or open space of at the least one square [a square is defined by the act to be 100 square feet], exclusive of any building thereon, unless all the rooms of such house can be lighted and ventilated from the street, or from an area of the extent of at the least three-quarters of a square above the level of the second story, into which the owner of the house to be rebuilt is entitled to open windows for every room adjoining thereto. And if any house already built be hereafter rebuilt, then, unless all the rooms of such house can be lighted and ventilated from the street, or from an area of the extent of at the least three-quarters of a square, into which the owner of the house to be rebuilt is entitled to open windows for every room adjoining thereto, there must be above the level of the floor of the third story an open space of at least three-quarters of a square. And to every building of the first class must be built some roadway, either to it or to the enclosure about it, of such width as will admit to one of its fronts of the access of a scavenger's cart. With regard to the lowermost rooms of houses, being rooms of which the surface of the floor is more than three feet below the surface of the footway, and to cellars of buildings hereafter to be built or rebuilt, if any such room or cellar be used as a separate dwelling, then the floor thereof must not be below the surface or level of the ground immediately adjoining thereto, unless it have an area, fireplace, and window, and unless it be properly drained. And to every such lowermost room or cellar there must be an area not less than three feet wide in every part, from six inches below the floor of such room or cellar to the surface or level of the ground adjoining to the front, back, or external side thereof, and extending the full length of such side; such area, to the extent of at least five feet long and two feet six inches wide, must be in front of the window, and must be open, or covered only with open iron gratings. And for every such room or cellar there must be an open fireplace, with proper flue therefrom, with a window-opening of at the least nine superficial feet in area, which window-opening must be fitted with glazed sashes, of which at the least four and a half superficial feet must be made to open for ventilation. With regard to rooms in the roof of any building hereafter built or rebuilt, there must not be more than one floor of such rooms, and such rooms must not be of a less height than seven feet, except the sloping part, if any, of such roof, which sloping part must not begin at less than three feet six inches above the floor, nor extend more than three feet six inches on the ceiling of such room. With regard to rooms in other parts of the building, every room used as a separate dwelling must be of at the least the height of seven feet from the floor to the ceiling.

§§ 54 and 55 provide for the restraint and eventual removal from populous neighbourhoods of trades which are dangerous, noxious, or offensive. Businesses dangerous as to fire must not be nearer than fifty feet to other buildings; and new businesses of this character must be forty feet from public ways. Persons are not in future to establish or newly carry on any such businesses within fifty feet of other buildings or forty feet from public ways; and all such businesses now carried on within the distances limited by the act must be given up twenty years after the passing of the act. A penalty of 50*l.* is incurred for erecting buildings in the neighbourhood of any such businesses, and 50*l.* per day for carrying on businesses of a dangerous kind contrary to the act. The persons offending may be imprisoned for six months if the penalty be not paid. The businesses of a blood-boiler, bone-boiler, fellmonger, slaughterer of cattle, sheep, or horses, soap-boiler, tallow-melter, tripe-boiler, and any other business offensive or noxious, are subject to similar regulations as those deemed dangerous as to fire, and are to be discontinued at the end of thirty years after the passing of the act. Trades deemed nuisances may be removed by purchase at the public cost on memorial by two-thirds of the inhabitants, and on the issue of an order in council. Public gas-works, distilleries, and other works under the survey of the Excise are exempted from the operation of the provisions contained in §§ 54 and 55.

The whole number of clauses in the act is 118; and there are schedules of great length. They involve matters of technical detail which it would be useless to give: our object is only to exhibit the general character of this important legislative measure.

BUILDING STONE. [STONE FOR BUILDING, P. C. S.]

BULARCHUS, of Lydia, in Asia Minor, has the distinction of being the earliest painter on record. He was a distinguished painter at least as early as 720 years before Christ. Pliny (*Hist. Nat.* xxxv. 34) tells the following story about him:—He painted a battle of the Magnetes, for which Candaules, king of Lydia, about 716 B.C., gave him either the weight of the picture in gold or as much gold coin as would cover it. Neither of these versions may be true, but it appears evident that the picture was purchased by Candaules at a high price. Pliny in another part of his work (vii. 39) speaks of this picture as representing the destruction of Magnesia; and the late K. O. Müller has, in his 'Archæology of Art,' on this account rejected the tradition, because the only known destruction of Magnesia took place, according to Archilochus, about forty years after the death of Candaules, through Ardys, the successor of Gyges. Pliny however in the first instance mentioned, where he treats more particularly of art, calls it a Battle of the Magnetes, 'in qua erat Magnetum prœlium.' This may appear a singular and incredible incident, but it is not an isolated fact regarding the early existence of painting in Asia Minor. There is much evidence in antient writers to show that painting was comparatively an old art in Asia Minor and among the Ionian Greeks, while at the same period in Greece itself there is scarcely any evidence of its existence.

(*Dictionary of Greek and Roman Antiquities*, edited by W. Smith, Ph. D., article 'Painting.')

BULLANT, JEAN, one of the few early French architects of modern times, or of the *Renaissance* period, whose names have acquired historical celebrity, is supposed by Callet to have been born at Ecouen, at which place he died, in 1598, at the age of seventy-eight; accordingly the year of his birth must have been about 1520. All that is known of his origin is that he was a retainer of the Montmorency family; that he visited Italy in his early youth, and returned from Rome in 1544. For an adequate opportunity of displaying his professional acquirements he had not to wait long, having been employed the following year by the celebrated Constable Anne de Montmorency, to erect, conjointly with Jean Goujon, the Château d'Ecouen, in which work he took especial pains to show how diligently he had studied classical antiquity and imbibed its spirit, by parading the 'orders' in a variety of ways. Yet notwithstanding the 'purity' and 'correctness' of taste claimed for its decorations of that kind, the whole pile was a grotesque mixture of the antique, or rather the modern Italian orders, applied to what was in all other respects decidedly French in physiognomy, with immense *roofs, large* and fantastically ornamented lucarnes, and other
characteristics of that age and country. Nay, even
or French-Gothic style of the period was allowed
itself externally and very conspicuously also in the
dows of the chapel placed in one wing of the entran
while the entrance itself formed a portal or lofty fro
decorated with Doric and Ionic columns, and a third
termini in half-length figures. The principal alta
chapel (now removed to that at Chantilly) was entire
antique or modern-antique style of the time, and has b
sidered Bullant's masterpiece,—supposing him to have
the sculpture also. At the time of the Revolution
and subsequently, such very great changes were m
the present condition of this château affords little id
original design. Of the palace erected by Bullant f
rine de Médicis (originally called L'Hôtel de la R
afterwards L'Hôtel Soissons), not even so much re
fact, nothing save the astrological column which sto
angle of the court, and is now attached to the Halle
which occupies the site of what was Catherine's
For the same princess he also altered and enlarged
teau de Chenonceau—the scene of fêtes and revel
magnificent than decorous. Another work attribute
is the Hôtel de Carnavalet at Paris, but this is
doubtful. It is certain however that he was emplo
the palace of the Tuileries (begun 1564), although
exactly known what was his share in the work, and
of his associate Delorme. After having enjoyed t
not only of Catherine, but of Henri II. and H
(under both of whom he held the office of comptroll
royal buildings), he found another royal patron in H
for whom he build a portion of the Gallery of the
the end next the Tuileries. Bullant was the auth
works, viz. 'Règles Générales d'Architecture,' 1
'Traité de Géometrie et Horolographie,' 1567; t
of which is regarded as the earliest authority in the
on the subject of the so-called *five* orders.

(Callet, *Notice de quelques Architectes Françai
zième Siècle.*)

BUMASTES, a genus of Trilobites, thus name
Murchison, includes the B. Barriensis or Barr Trilobi
occurs in the upper Silurian strata.

BU'NIUM, a genus of plants belonging to th
order Umbelliferæ, the suborder Orthospermeæ, and
Ammineæ. It has an obsolete calyx; obcordate pet
broad obtuse inflexed point; an oblong fruit, the car
5 filiform equal ridges; the interstices with 1 or
the stylopodium conical. The species are perenn
with usually tuberose and globose roots, square ste
pound leaves, and white flowers.

B. flexuosum, Pig-nut, has a general involucre of 1
partial more numerous; fruit oval, narrowing upwards
with the elongated stylopodium and erect styles,
with 3 vittæ. This species is the B. *denudatum* of
dolle: it is a native of the west and south of Europe,
tiful in Great Britain. It has a nearly globular root,
or chestnut colour on the outside and white inside.
aromatic sweet taste, and is frequently dug up
by children. It is called in this country by many
earth-nut, ar-nut, kipper-nut, hawk-nut, jur-nut, ea
nut, and ground-nut. The synonymes are almost as
in the French and German languages. Pigs are ver
this nut, and get fat when they are allowed to feed
When boiled they are a pleasant and nutritious food.
they are preferred by some people to chestnuts, and
in this country and on the Continent added to soup

B. Balbocastanum of Linnæus is a different spe
the latter, though often confounded with it. Its ge
partial involucres are composed of numerous leaves,
oblong, crowned with the short stylopodium and reflex
the interstices with single vittæ. This plant has lately
covered in chalky fields in Cambridgeshire and Her
probably more generally diffused. George Don e
in the 'Gardener's Dictionary' sixteen species of Bu

(Babington, *Manual of Brit. Bot.*)

BUNTER SANDSTEIN, the lowest arenace
ber of the triassic system of strata, as understood in
(the lowest part of our Mesozoic series). The th
are—

Keuper above, marly.
Muschelkalk in middle, calcareous.
Bunter Sandstein below, arenaceous.

This classification is applicable to England by retren
middle term. Mr. Murchison is of opinion that p

er Sandstein (Grès bigarrè of France) belongs to the ozoic series, but no proof of this is yet published.

UONARRUOTI, MICHEL-AGNOLO, the Younger, born in 1568, in the city of Florence. He was the son ionardo di Buonarruoto, brother of the great Michelolo, or Michel-Angelo, as the name is now usually n; his mother was Cassandra di Donato Ridolfi. The lfi and Buonarruoti were both families of the nobility of ence. Michel-Agnolo the Younger was born between and five years after the death of his uncle. He displayed a for literature and science at an early age, and studied ematics and natural philosophy under Galileo. He became a ber of the Academy of La Crusca at the early age of seven-, his introductory lecture having been delivered in 1585. was also a member of the Florentine Academy, and was inted to offices of the highest dignity in both academies. onstructed a gallery in his house, and filled it with a ndid collection of works of art and Florentine antiquities, held assemblies of the most distinguished artists and litemen in Florence. Soon after Urban VIII. became pope, nvited Michel-Agnolo to Rome, where he resided some , and gave instructions in the mathematical sciences to the 's nephews. He died January 11, 1646.

ichel-Agnolo Buonarruoti the Younger is chiefly distinhed as the author of two dramatic compositions—'La cia' and 'La Fiera.'

La famosissima Tancia,' as Crescimbeni calls it, though ten in ottava rima, is not a poem, but a play in five acts. characters are all peasants of the neighbourhood of the of Florence, except two, who are citizens, and, except two, they all speak in the country dialect of Tuscany. La cia is the name of the principal female character, a country ty more distinguished for simplicity than wit. This rustic a is a composition of great excellence. The characters are ited with great distinctness and without exaggeration; ialogue is rapid and animated; and the humour, which chiefly from the simple notions and natural expression country people, exhibiting their feelings and modes of ; and superstitions, is highly amusing, and without any of grossness. There is not much action, and some of ircumstances are extravagant. As a specimen of the ry dialect of Tuscany at the period when it was written, Tancia' is a work of the highest reputation. It was xhibited in 1611, and first printed in 1612, without the of the author.

a Fiera' is a series of five comedies, of five acts each, ing altogether a connected exhibition of characters nnot be called a dramatic fable, or interwoven series of ts) in twenty-five acts. It was written especially for use of the Academy of La Crusca in the composition of first edition of their great 'Vocabulario' or Dictionary he Italian language. The purpose for which it was ten will be best explained by an extract from Dr. John's Preface to his Dictionary.

That many terms of art and manufacture are omitted must frankly acknowledged; but for this defect I may boldly ge that it was unavoidable. I could not visit caverns to n the miner's language; nor take a voyage to perfect my l in the dialect of navigation; nor visit the warehouses of rchants and the shops of artificers to gain the names of es, tools, and operations, of which no mention is found in ks. What favourable accident or easy inquiry brought hin my reach has not been neglected; but it had been a peless labour to glean up words by courting living information, and contesting with the sullenness of one and the ghness of another.

'To furnish the Academicians della Crusca with words of s kind, a series of comedies called "La Fiera," or the Fair, s professedly written by Buonarroti; but I had no such istant, and therefore was content to want what they t have wanted likewise, had they not luckily been so plied.'

The number and variety of characters exhibited in 'La Fiera' so great as not to be easily counted; they are of all grades ociety, and of all professions and trades,—besides numerous gorical characters, which give the work as much the appeare of a series of masques as of comedies. In its style of position it is also more poetical than 'La Tancia,' with y chorusses and lengthened lyrical dialogues; and has gether less of dramatic interest and animation. In the ity of the terms selected, as well as of the idiom, the work f high repute.

La Fiera' was first performed in the Carnival of 1618 in the theatre of the great Hall of the Offices (Sala degli Ufizj) in Florence. It was never printed till 1726, when 'La Fiera' and 'La Tancia' were published in folio, with copious explanatory and philological notes by Salvini. 'La Fiera, Commedia di Michelagnolo Buonarruoti il Giovane, e La Tancia, Commedia Rusticale del Medisimo, coll' Annotazioni dell' Abate Anton Maria Salvini, Gentiluomo Fiorentino e Lettor delle Lettere Greche nello Studio Fiorentino.' The notes of Salvini to both pieces are very useful, though somewhat pedantic.

Two other dramatic pieces by Michel-Agnolo the Younger, 'Il Natale d' Ercole' and 'Il Giudicio di Paride,' have been printed; they are of the class called masques. The 'Cicolate' is printed in the 'Prose Fiorentine.' He also was the first publisher of the poetry of his uncle, 'Rime di Michel-Agnolo Buonarruoti, raccolte da Michel-Agnolo suo Nipote,' Firenze, 4to. 1623. Many other works in MS. are said to be in the possession of the descendants of his family.

(*Life* annexed to Salvini's edition of 'La Fiera' and 'La Tancia.')

BUONINSEGNA. [DUCCIO DI BUONINSEGNA, P. C. S.]

BUOYANCY is the power which certain materials have of being supported at the surface of a fluid so as to sink in it as much only as a part of their depth or thickness; thus ice, some woods, &c. are said to have buoyancy in water. Almost all solid bodies have the power of floating on mercury. The term is frequently used to designate the weight by which a solid mass of wood, or a vessel of wood or metal, can be made to sink in water till its upper surface is on a level with that of the water, or till a horizontal section of the body, at a given distance from the upper or lower surface of the latter, is on that level.

It is shown [HYDROSTATICS, P. C.] that, when a body is immersed in a fluid, the weight of the body with whatever it may carry is equal to the weight of as much of the fluid as is equal in volume to the immersed part of the body. Hence, if the specific gravity of a body and that of a fluid are given (the former being less than the latter), the buoyancy may be found. Thus, by the rules of mensuration, find in cubic feet the volume of the body, if it is to be wholly immersed, or the volume of the part only which is to be under water, and multiply it by the specific gravity of water (the weight of a cubic foot of the fluid), the product will be the weight of the water displaced: subtract, from this product, the weight of the body; and the result will be the required buoyancy, or the weight which it will carry without sinking lower than the given depth. If the body, suppose it to be a log of timber, cannot be actually weighed, the product of its volume by its specific gravity will express its weight.

If it be required to find the volume of a rectangular mass of timber, of given depth, which will support a given weight, the following equation may be formed:—

Let s be the unknown area of a horizontal section through the mass of timber, and consequently the horizontal surface of the displaced water. Let d be the given depth of the mass of wood and d' the given depth to which it is to be immersed. Let g be the specific gravity of the wood and g' that of the water; also let W be the given weight which is to be supported:

$$\text{Then } s \times d \times g + W = s \times d' \times g' ;$$

$$\text{whence } s = \frac{W}{d'g' - dg}$$

and this value of s being multiplied by d, will give the required volume.

In a similar manner may the buoyancy of casks or other vessels be found, or the number of vessels which would be required to float any given weight; the volumes being found by the rules of mensuration, and the weight of a vessel by experiment or by the volume and specific gravity of its solid part.

This proposition is useful in determining the amount of volume which would have buoyancy sufficient to raise a sunken ship, or in determining the dimensions of a floating bridge which may support a given weight of troops or artillery.

BUOYS AND LIFE-PRESERVERS. Many ingenious plans, more or less practicable, have been proposed within the last few years, for saving from drowning those who may be in peril by shipwreck or otherwise. In LIFE-BUOY, P. C., several contrivances are noticed, which up to that time had been suggested for this purpose, such as those of Lukin, Greathead, Wilson, Bremmer, Bray, Gordon, Ansell, &c. Those which have since been brought forward may be grouped together under three headings, according as they relate to *boats, buoys,* or *garments.*

water. Secondly, he floated by its means a weight
fifteen and sixteen pounds. Thirdly, he personally
contrivance in water six inches deeper than his
; when he floated, with head, neck, and shoulders

ce, in 1843, introduced a contrivance in which
respiration are both attended to. There is an
or cushion of India-rubber attached to the back to
vearer to float in water with his face uppermost;
a wire-gauze protector fixed over the mouth and
icient to admit air for respiration, but to repel
other contrivance, that of Mr. Symington, consists
ly formed jacket or belt, capable of being quickly
the waist, and having buoyancy enough to keep
the wearer above water.

US, an early Greek sculptor of the island of
of a family long celebrated as statuaries, was the
ermus mentioned by Pliny, and the brother of
d lived about the sixtieth Olympiad, or 540 B.C.
known for the enmity between him and the poet
an for his works, though both Pliny and Pausanias
al of them. The quarrel between Bupalus and
s supposed to have originated in the sculptor re-
e his daughter in marriage to the poet: who ac-
ed his well-known satirical weapons against him;
the sculptor retaliated by executing a ridiculous
pponax, who, it seems, from some peculiarities of
was easily made ridiculous. This plastic satire
d by the poet by some satirical iambics upon Bu-
pungent a nature, according to a report, no doubt
ake the sculptor hang himself. The story seems
common centuries after the time of Bupalus, for
od., ode vi.) has the words 'Acer hostis Bupalo'
t indication of Hipponax. Pliny (*Hist. Nat.*,
peaks of works by the brothers Bupalus and
Chios, Lesbos, Delos, and at Rome. Their
rmus was the son of Micciades, who was the son
pon some of their works at Delos they wrote,
t to be celebrated for its vines only, but also for
f the sons of Anthermus.' There is a sitting
s in the Vatican, with Βούπαλος ἐποίει on the
is evidently, from its fully developed style, of a
period than that of the subject of this notice.
Clementino, i. tab. 10.)
atalogus Artificum; Sillig, *Catalogus Artificum*;
pochen der Bildenden-Kunst, &c.)

RUM (from βοῦς, ox, and πλεῦρον, side), a
nts belonging to the natural order Umbelliferæ,
Orthospermeæ, the tribe Ammineæ. It has an
x; entire, roundish petals, with a closely involute,
e point; the fruit subdidymous; carpels with
d or filiform and sharp or obsolete ridges; inter-
r without vittæ; stylopodium depressed. The
uite smooth, herbs or shrubs. The leaves are
most instances being quite entire. This arises
ossessing no lamina; they are composed entirely
des, and are in fact phyllodia. The flowers are

about fifty species of Bupleurum. They are na-
erate climates in most parts of the world. They
y the common name of Hare's-ear. When eaten
ey are supposed to injure them and cause dis-
e abdomen; hence the generic name. *B. ro-*
is the Thorow-wax of the herbalists. It has a
m, with oval perfoliate leaves, and the fruit with
ices. It was supposed to possess especial virtues as
but there is no question now that wounds are better
such applications. There are three other British
nuissimum, *B. aristatum*, and *B. falcatum*. The
sometimes cultivated in gardens. The annual
require to be sown in the open ground early in
The perennial may be increased by dividing their
rubby by cuttings.
rd Dict.; Babington, *Man. of Brit. Bot.*)

TIS (Fossil). The elytra of beetles found at
ave been referred to this genus.

RA. [BERBERRA, P. C. S.]

, REV. GEORGE, was born in London on the
, or, according to the New Style shortly after-
uced, the 5th of June, 1752. As he showed an
r drawing, he was placed under the tuition of an
Isaac Taylor. About 1773 he became a student
l Academy; but shortly afterwards he began to
preach, and at length determined to relinquish his profession, and to devote himself wholly to the Christian ministry. In 1778 he became pastor of a Congregational or Independent church at Lancaster; in 1783 he removed to Coventry, during his residence in which city he took an active part in the formation of the London Missionary Society; and in 1803 he accepted a unanimous call to the pastorship of the Congregational church in Fetter Lane, London, his removal to the metropolis being further urged by a request to undertake the offices of secretary to the London Missionary Society, and editor of the 'Evangelical Magazine,' then vacant by the death of the Rev. John Eyre. The duties of these offices were performed by Burder with much zeal and peculiar talent, until increasing years and infirmities compelled him to resign them; and, during a period of more than twenty years after his removal to London, he took a prominent part in the various religious movements of the body with which he was connected, and of which he was one of the most influential and universally respected members. Burder died at the age of eighty, on the 29th of May, 1832. His publications, which were numerous and exceedingly useful, consisted chiefly of religious essays and sermons of a peculiarly simple character, which have gained a high reputation far beyond the limits of his own religious denomination. Of these the 'Village Sermons,' of which six volumes appeared at various times between 1799 and 1812, and which have been repeatedly reprinted, and translated into several European languages, are perhaps the best known. Of forty-eight 'Cottage Sermons,' 'Sea Sermons,' and 'Sermons to the Aged,' written for the Religious Tract Society, the aggregate circulation during his life amounted to little short of a million copies. Among his other publications were, 'Evangelical Truth Defended,' 8vo., 1788; an abridgement of Dr. Owen's 'Treatise on Justification by Faith,' 8vo., 1797; 'The Welsh Indians, or a Collection of Papers respecting a people whose ancestors emigrated from Wales to America in 1170, with Prince Madoc, and who are said now to inhabit a beautiful country on the west side of the Mississippi,' 8vo., 1797; 'Missionary Anecdotes,' 12mo., 1811; and a new edition, revised and considerably extended, of the Rev. Laurence Howel's 'History of the Bible,' in three volumes, 8vo. and 12mo., 1807. Burder also edited Bunyan's 'Pilgrim's Progress' and 'Holy War,' and Matthew Henry's 'Commentary,' and published several other works, some of which are mentioned in an obituary notice in the 'Gentleman's Magazine' for July, 1832, and in the 'Memoir' published in 1833 by his eldest son, Henry Forster Burder, D.D., which is partly autobiographical. There is also a pretty full account of Burder in Dr. Morison's 'Fathers and Founders of the London Missionary Society.'

BURDETT, SIR FRANCIS, BART., was born on the 25th of January, 1770, and was the third son of Francis Burdett, second son of Sir Robert Burdett, Bart., of Bramcote, Warwickshire. His mother was Eleanor, daughter and co-heiress of William Jones, Esq., of Ramsbury, in Wiltshire. Before the death, in 1797, of his grandfather, Sir Robert, who had also succeeded his grandfather in the title, the subject of the present notice had lost both his father and his two elder brothers; and, his father's elder brother having previously died, he became baronet. His father had died in 1794; and Sedley, the last of his two elder brothers, had been drowned, along with Lord Montague, in 1793, in attempting to cross the falls of the Rhine at Schaffhausen in a small boat. The baronetcy had been conferred in 1618 upon his great-great-great-grandfather, Sir Francis, said to be the nineteenth in lineal descent from Hugh de Burdett, who came over with the Conqueror. Thomas Burdett, who was put to death in the reign of Edward IV., for wishing that the man who had moved the king to kill a favourite white buck in his park at Yarrow had the horns in his belly, was an ancestor of the late baronet. Sir Francis was educated at Westminster School, and afterwards spent some years on the Continent. In 1793 he married Sophia, youngest daughter of the late Thomas Coutts, Esq., banker. In 1796, being still Mr. Burdett, he was, by the interest of the Duke of Newcastle, returned for Boroughbridge, in Yorkshire, his colleague being Sir John Scott, afterwards Earl of Eldon and Lord Chancellor. A few years subsequent to this, on succeeding to the estates of his mother's family, he assumed, in addition to his paternal name, that of Jones, which however he soon afterwards resigned. From his first entry into parliament Sir Francis had followed an extreme course of popular politics, opposing the government and the war, advocating a reform in the representation, and especially distinguishing himself by an inquiry which he got set on foot into the abuses of the Cold Bath Fields and other prisons. This led to his being brought forward at the general election in 1802 as a candidate for the representation of Middlesex, in opposition to Mr. Mainwaring, who was chairman of the County Sessions, and had been the person by whom the investigation into the prison abuses had been principally resisted and impeded in the House. The public excitement which this contest occasioned was unexampled. It ended on the 15th day by giving Sir Francis a majority of 371 votes over his opponent; but a committee afterwards declared the election void, and the House sent the two sheriffs to Newgate. A new election took place in July, 1804, the other candidate being now Mr. Mainwaring's son, the father having disqualified himself by an infringement of the Treating Act; and at the conclusion of the poll Burdett was left in a minority of five, the numbers being 2828 and 2823. But this election was also declared void by a committee, the report declaring at the same time that Sir Francis ought to have been returned. On this his return was also attacked; and eventually another committee, on the 8th of February, 1806, found that Mainwaring had a majority of one, and that he ought to be the member. Three of Burdett's voters, being afterwards prosecuted, were sentenced to transportation to Botany Bay; and the proceedings altogether are said to have cost Sir Francis above a hundred thousand pounds. At the next general election, in 1806, he was again proposed for the county; but this time he only polled 1197 votes, and Mr. Mellish was returned. In May, 1807, a duel took place between Sir Francis and Mr. James Paull, whom he had supported as the popular candidate for Westminster the year before: they fought at Combe Wood near Wimbledon Common, and at the second exchange of shots both were seriously wounded. While they lay ill, both were put in nomination for Westminster at the new general election; and the result was that, after a contest of fifteen days, Sir Francis was brought in at the head of the poll, having obtained 5134 votes (his colleague Lord Cochrane only polling 3708), and that Paull was left fifth, and at the bottom, with only 269. At the preceding election Paull had had 4365 votes, being only 277 under Mr. Sheridan, the successful candidate. Sir Francis continued to sit for Westminster from this time for nearly thirty years. The great event of his subsequent career is his committal to the Tower by the House of Commons, in March, 1810, for a letter to his constituents denying the power of the House to imprison delinquents, which he published in Cobbett's 'Political Register,' and which the House voted to be libellous and scandalous. He attempted to resist the Speaker's warrant, and some lives were lost in a street contest between the military and the people; but he eventually surrendered, of course, and he lay in prison from the 9th of April till the prorogation of parliament on the 21st of June. Sir Francis continued to adhere to the popular side in politics till some time after the appointment of the Melbourne ministry, in April, 1835, when he went into opposition against his old friends in the government, on the ground principally of the court he charged them with paying to Mr. O'Connell and his followers in their agitation against the Irish established church. In these circumstances he declined standing for Westminster at the general election in July, 1837; but he was returned for Wiltshire, and he sat for that county till his death, which took place on the 23rd of January, 1844. Lady Burdett had died only a few days before.

(*Public Characters*, vol. v.; Beatson's *Chronological Register of Parliament*; *Annual Register*; *Parliamentary History*; *Biographical Index to House of Commons*, &c. &c.)

BURDIE HOUSE, a locality near Edinburgh, where a thin band of carboniferous limestone, remarkably rich in Entomostraca, and containing Sphœnopteris, and other land plants, occurs. It has been described by Dr. Hibbert, in the Trans. of the Royal Soc. of Edinburgh.

BURGAGE HOLDING is one of the forms of feudal tenure in Scotland. The holders of the fiefs under the charters of privileges in favour of the burghs, held directly of the crown, returning service by watching and warding. The return is now merely nominal, but the holding is still of the crown, though the investiture is given by the magistrates of the burgh. The peculiar character of this holding has preserved in modern practice the important distinction, that while other descriptions of landed property may be subfeued ad infinitum, a burgage holding can only be transferred from one crown vassal to another, who comes in his place. All transfers, to constitute real rights, must be followed recorded in the books of the sheriff clerk of the burg the lands held by or of a royal burgh are not necessar by burgage tenure. The community may, like an in obtain feu rights and grant subinfeudations; the pro gage holding is applicable only to those lands to the charter granting burgal privileges for the usual applies.

BURGKMAIR, HANS, a celebrated old German and wood-engraver, born at Augsburg in 1472. H some time in Nürnberg, and was the contemporary, some supposed to have been the scholar, of Albrecht They appear to have worked together, but the schola a mere conjecture, which, like many other simila jectures, has apparently arisen from a species of hero-w or an anxiety to show that Albrecht Dürer was or indirectly the source of everything excellent in art t produced in his own time and country.

There are still several excellent paintings in oil, fo period, by Burgkmair, preserved in the galleries of V Munich, and Schleissheim; and there are others at Nü and at Berlin. He painted also in fresco and in dis and he illuminated manuscripts; but he is better known woodcuts, or at least those cut from his designs, which to nearly seven hundred, including some maps. The T of the Emperor Maximilian I., in 135 large cuts, with a tion by the emperor, is one of his chief works; it w cuted in 1519, the year of Maximilian's death, chi Burgkmair: some of the prints are marked with hi in full; others with merely H. B. He executed, with assistance, another series of cuts in commemora the same emperor, entitled Der Weiss Kunig (Th King), of which there are 237 large cuts, being illu of the deeds of Maximilian, from the description of Sauerwein. The emperor is said to have superinten work himself. The blocks are still preserved in the of Vienna. There is also by Burgkmair an equestri trait of Maximilian, in chiaroscuro, dated 1518. He an excellent portrait of Johann Baumgärtner, dated 15 a picture of St. George on horseback, both in chia On Burgkmair's prints in chiaroscuro another name oc sides his own—Jost de Negker, to whom probably th tion of the chiaroscuro is due. Besides these and man woodcuts, there are several etchings and two en attributed to Burgkmair. His paintings are carefu solidly executed, but are Gothic in taste; there are t Pinakothek at Munich, of which that of the three Liborius, Eustace, and Roch, is strikingly excellen style (Cabinet ii. No. 24). In the gallery of the B at Vienna there is a picture by Burgkmair of himself wife, with their ages inscribed upon it, dated May 10 his fifty-seventh year. The year of his death is not but it is supposed to have been 1559. Sandrart has portrait of Burgkmair in his 'Teutsche Academie,' there is a print by G. C. Kilian, of the Vienna po Burgkmair and his wife.

(Heineken, *Dictionnaire des Artistes*, &c.; Mech *bleaux de Vienne*; Bartsch, *Peintre-Graveur*; Hell *schichte der Holzschneidekunst*, &c.)

BURGLARY. [HOUSEBREAKING, P. C. S.]

BURIAL. [INTERMENT, P. C.]

BURMA'NNIÆ, a natural order of plants belon Lindley's group of epigynous Endogens. It was fi stituted by Sprengel as a separate order, and is so made a section of Amaryllideæ. The species of pla longing to this order are herbaceous, with tufted radic leaves, or none at all, with terminal flowers, which ar upon a 2- or 3-branched rachis, or solitary. The flow hermaphrodite; the perianth tubular, superior, coloured branous, with 6 teeth, the 3 inner ones minute, the larger with a wing or keel at the back; the stamens serted in the tube opposite the petals, with sessile 2 anthers opening transversely with a fleshy connecti sometimes 3 sterile stamens alternate with them; th inferior or 3-celled, many-seeded, with the dissepiment nate with the wings of the perianth; the style singl stigma 3-lobed, petaloid; the capsules covered withered perianth or 3-celled, bursting irregularly; th being numerous, minute, striated with an aril, fleshy al and minute embryo.

The genus Burmannia, on which this order ha founded, is variously assigned by different botanists. placed it in Bromeliaceæ, Brown in Juncaceæ, Von

Hydrocharaceæ, Blume places it between Juncaceæ and laceæ, Lindley near Hæmadoraceæ, and there can be e doubt of the propriety of constituting it a distinct er. The species are natives of Asia, Africa, and erica. The genera referred to this order are Burmannia, pterella, Gonyanthes, Gymnosiphon, Apteria. They not very conspicuous properties; the Apteria setacea id by Nuttall to possess tonic and astringent properties. pterella cærulea is also said to have a flavour very similar at of green tea.

indley, *Natural System;* Burnett, *Outlines of Botany.*)

URNES, SIR ALEXANDER, was born May 16, 1805, ontrose, in Scotland. His father was an active magistrate orfarshire, and held successively the chief official situa- in the borough of Montrose. His grandfather was the her of William Burnes, father of the poet Burns, who was irst to omit the letter e from the family. Alexander Burnes educated at the Montrose Academy, in which he greatly nguished himself. Having obtained a cadetship in the bay army, he left school at the age of sixteen, and arrived mbay Oct. 31, 1821. On the 25th of December, 1822, as appointed interpreter in Hindustanee to the 1st extra lion at Surat, and, on account of his proficiency in the ian language, the Judges of the Sudder Adaulut appointed without solicitation, to the office of translator of the Per- documents of that court.

consequence of disturbances in Cutch, the regiment to h Ensign Burnes was attached, the 21st Bombay native try, having been ordered to Bhooj, he joined it there in l, 1825. He was soon afterwards made quartermaster of de, and in November, 1825, when he was only twenty, ppointed Persian interpreter to a force of eight thousand assembled for the invasion of Scinde. In August, 1826, as confirmed on the general staff as deputy-assistant- ermaster-general.

this period he drew up an elaborate paper on the statis- f Wagur, for which, in 1827, Lieut. Burnes received the s of the Bombay government and the special commenda- of the Hon. Mountstuart Elphinstone, the governor; and btained similar testimonies of approbation in 1828 for a oir on the eastern mouth of the Indus. Lieut. Burnes appointed assistant-quartermaster-general to the army, ch 18, 1828, and in Sept. 1829, was appointed assistant e political agent in Cutch, in prosecution of the survey of north-west frontier. (He has given an account of this ey in the Transactions of the Royal Geographical Society 834.) He soon afterwards made a journey into Rajpoo- , from which however he was recalled; and in 1830 was inted by the Indian government to proceed to Lahore some remarkably large horses, as a present from the king England to Runjeet Singh, the ruler of the Panjab. The ils of this expedition are given in the third volume of his avels into Bokhara.' The mission was directed to proceed the devious route of Scinde; the secret object being to ob- information concerning the Indus, the envoy was provided h letters to the Ameers, and, the better to obviate suspicion, took with him a guard of wild Beloochees. The mission led from Mandavie in Cutch, Jan. 21, 1831, and on the th reached the western mouth of the Indus. After a long d tedious negotiation with the rulers of Scinde, Burnes re- ived their full sanction to proceed by water from the mouth the Indus. The delay however had been turned to account. rnes had made a complete survey of the mouths of the er, and a map of the lower part of its course. After nding a week at Tatta, they set sail up the river, April 12th, d reached Hyderabad on the 18th, where he was received h great cordiality by the Ameers. The mission remained t Hyderabad till the 23rd of April, when they re-embarked n the Indus, and after visiting all the places of importance ng the banks, on the 18th of July they arrived at Lahore, ere their reception was magnificent, a deputation of nobles ducting the envoy and his suite to the door of the palace of njeet Singh, amid salutes of musketry and artillery. 'While g,' says Burnes, 'to remove my shoes at the threshold, suddenly found myself in the arms and tight embrace of a inutive old-looking man, the great maharaja Runjeet Singh, ho conducted me by the hand to the interior of the court, d had advanced that distance to do us honour.'

After remaining till the middle of August with Runjeet gh, who treated Burnes with the familiarity of a friend, the sion left Lahore, crossed the Sutlege, and proceeded to odiana, a frontier station of the Indian government, where nes became acquainted with the ex-kings of Cabool, Shah Zeman and Shah Shoojah, who were living there under the protection of the British government. From Loodiana the mission proceeded to Simla, where Burnes met the governor-general, Lord William Bentinck, who without delay entered into negotiations for laying open the navigation of the Indus to the commerce of Great Britain.

After his return from his mission, Lieut. Burnes proposed to Lord William Bentinck an expedition into Central Asia, which received from his lordship the most liberal encouragement. The sanction of the Indian government having been obtained, the journey was commenced in January, 1832. Lieut. Burnes was well provided with instruments, and made his journey a kind of flying survey. Arrowsmith's map, compiled from his labours and every other available source, is probably the most perfect now existing of the countries which it embraces.

Burnes left Delhi, accompanied by Mr. James Gerard, surgeon of the Bengal army, Dec. 23, 1831, and proceeded by express to Loodiana. Previous to entering on his journey, it was deemed necessary to obtain the sanction of Runjeet Singh to pass through Scinde. He descended the Sutlege, and reached Lahore Jan. 17, 1832, and was received by the maharaja with all his former affability. Their departure was delayed till the 11th of February, when, having crossed the Ravee, they put up for the night in one of the houses which surround the once splendid monument of Jehangeer. Here they divested themselves of every article of European costume and comfort, and adopted not only the costume of the Afghans, but their usages. The close dress, beds, boxes, tables, and chairs, were all discarded for a flowing robe, a coarse carpet, and a blanket; and their now diminished wardrobe, with the necessary books and instruments, were deposited in their saddle-bags, and thrown across their horses' quarters.

The troops of Runjeet Singh escorted them across the Chenab and the Jelum to their frontier, about three miles beyond Attock, where they met the Afghans, and proceeded with them to Acora. Thence they proceeded to Peshawur, which they left April 19, under the protection of one of Mohammed Khan's officers; and passing through Jellalabad, reached Cabool by the Latabund Pass, April 31. They departed from Cabool May 18, and leaving Ghuznee on the south, advanced by the pass of Oonna, about 11,000 feet high, continued their journey along the base of the Kohi Baba through the country of the Huzaras, and ascended the pass of Hageeguk, 12,400 feet high, May 22. The snow bore their horses, and the thermometer fell to 4° Fahrenheit. They attempted to ascend the pass of Kaloo, 1000 higher than that of Hageeguk, but were hindered by the snow, and passed round its shoulder, but were unable to continue their route on horseback, and reached Bameean. After stopping a day to examine the wonderful excavations and enormous idols of the so-called city of Ghoolgoola, they crossed the pass of Acrobat, which separates the dominions of modern Cabool from Turkistan, or Tartary. After crossing the Dundan Shikun, or Toothbreaker, and the Kara Koottul, or Black Pass, on the 30th of May they made their last march among the mountains of the Indian Caucasus, and descended into the plains of Tartary at Khooloom, the frontier town of Morad Beg, the chief of Khoondooz, and were delayed by receiving a summons to his presence, at the village of Kaumabad, about fifty miles distant. Burnes assumed the character of a poor Armenian watchmaker journeying from Lucknow to Bokhara, and in his torn and threadbare garments happily escaped detection, received a pass of safe conduct for himself and his party (nine or ten tea-merchants who accompanied him), and on the 7th of June rejoined his friend Mr. Gerard, who had been left at Khooloom.

On the 8th of June they again set forward, and reached Balkh on the 9th, and after stopping three days to examine the ruins of that antient and once magnificent city, on the 12th they set forward at midnight on camels bearing panniers which held one person on each side. On the 14th they entered the desert, and on the 16th reached the bank of the Oxus, here 800 yards wide and 20 feet deep, which they crossed in boats, each drawn by two horses, which swam across the stream.

On the 27th of June the party reached the great eastern capital of Bokhara, where they remained till the 21st of July They then waited in the neighbourhood of Karakool till the 16th of August, when they accompanied a caravan, consisting of about 80 camels and 150 persons, some in panniers on camels, some on horses, and some on asses. In this manner they passed the great desert by Merve, and reached Meshed on the 14th of September. On the 17th they reached Koochan, a strong fortress, and here the two travellers separated, Mr. Gerard having resolved to proceed to Herat and Candahar, and then retrace his steps to Cabool.

On the 29th of September, Lieut. Burnes proceeded with a party of about 300 persons, Khoords, Persians, and Turcomans, and having passed by Shirwan and Boojnoord, left his companions, and travelled alone about eighty miles to the town of Astrabad. Thence, crossing an arm of the Caspian, he journeyed to Tehran, which he reached on the 21st of October, and having had the honour of being presented to the Shah of Persia, quitted the city on the 1st of November. Having passed through Ispahan and Shiraz, he embarked in a cruiser at Bushire, on the Persian Gulf, and reached Bombay on the 18th of January, 1833, the journey having thus occupied just a year.

Soon after his return, he set off for Calcutta, to lay the result of his travels before the governor-general, whose special thanks he received, and his memoirs were ordered to be transmitted to the Court of Directors. In June, Lieut. Burnes received orders to proceed to England as the bearer of his own dispatches. He left Calcutta June 10, and reached London early in October. His reception at the India House and by the Board of Control was in the highest degree flattering. On the 30th December he was presented at Court, and received the special acknowledgments of the king for the unpublished map and memoir which he had presented to his Majesty. His manuscripts were prepared for publication without delay, and Mr. Murray gave the author 800*l*. for the copyright of the first edition. The sale of the work was very large, nearly 900 copies having been sold the first day, and it was immediately translated into the French and German languages. Literary honours flowed fast upon him. He was elected a member of the Royal Asiatic Society, and on his admission, an emblazoned diploma was presented to him by Lord Munster. He was made a member of the Royal Geographical Society, and received the gold medal, and the royal premium of 50 guineas 'for the navigation of the Indus and a journey by Balkh and Bokhara across Central Asia.' The silver medal of the French Geographical Society was awarded to him, and on making a transient visit to Paris, his reception was enthusiastic.

After a stay of eighteen months in England, he departed for India, April 5, 1835, and proceeding by the south of France, Egypt, and the Red Sea, reached Bombay on the 1st of June, and was soon afterwards directed to resume his duties as assistant to the resident in Cutch, Colonel Pottinger.

In October, 1835, he was deputed on a mission to Hyderabad, in order to prevent the necessity of a war with Scinde. His mission was successful. The Ameers consented to a survey of the Indus, and to the abolition of the practice of robbing stranded vessels.

But a more important mission was prepared for him before he had completed his duties in Scinde. This was a mission to Dost Mohammed, at Cabool, primarily of a commercial nature. He was to proceed from Scinde through the Panjab, and by Peshawur to Cabool, and enter into commercial relations with Dost Mohammed; from Cabool to Candahar, to negotiate similar co-operation with the western chiefs; to institute inquiries as to the state of trade, and means of carrying it on; and to return by the Bolan Pass and through Scinde to India. The mission left Bombay Nov. 26, 1836, reached Hyderabad Jan. 18, 1837; Attock, August 4; and Cabool, Sept. 20.

Meantime, Mahomed Shah had besieged Herat with an army of 60,000 men, and the Indian government had become alarmed at the prospect of Persia and Russia uniting their forces with those of Afghanistan, and making a conjoint attack on our Indian Empire. This altered the object of Burnes's mission, and he made it his especial business to investigate the intentions of Dost Mohammed. The Persians indeed were compelled to retreat from Herat, but the presence of the Russian agent, Vicovitch, at Cabool, perplexed and alarmed Burnes, who pressed upon the Dost the propriety of dismissing Vicovitch, which the Dost however refused to do, and Burnes himself received his dismissal, April, 24, 1838.

Burnes was directed to repair to the governor-general at Simla, and he was there in August, 1838. Here it was resolved to replace Shah Shoojah on his throne at Cabool. Burnes preceded the army to make arrangements for the commissariat, and whilst at Shikarpoor, received a copy of the London Gazette, which announced his having been knighted and advanced to the rank of lieutenant-colonel.

Sir Alexander Burnes proceeded from Scinde on a political *mission into Beloochistan*, in which however he failed; and in April, 1839, he joined the army at Quettah. On t tion of Shah Shoojah, in September, 1839, he was political resident at Cabool, in which office he con he was murdered, Nov. 2, 1841, with his brother Charles Burnes and others, on the breaking out of rection in that city; for the details of which, and trous retreat of the British army, see AFGHANISTAN pp. 55, &c.

Sir Alexander Burnes was never married. His mother survived him, and he left three surviving br

Besides his 'Travels into Bokhara,' of which we a sketch, after his death was published 'Cabool Narrative of a Journey to and Residence in tha the years 1836, 7, and 8. By the late Lieut. Alexander Burnes,' London, 8vo. He was also of some papers in the Journal of the Royal Ge Society of London.

(*Asiatic Journal*, March, 1842; *Journal of t Geographical Society*, 1834, Part 2.)

BURNETT, GILBERT THOMAS, was born lebone, on the 15th of April, 1800. He was educa medical profession, and paid particular attention He commenced lecturing on botany at the Hunteri in Windmill-street, and afterwards lectured at the St. School of Medicine. On the foundation of King's was appointed to the Chair of Botany, and in 1833 lecturer to the Society of Apothecaries, and deli courses at their gardens at Chelsea. In the same ye lished his 'Outlines of Botany,' in 2 vols. 8vo. This tained an outline of the author's lectures on botany College. It displayed great research, and is a valua tory of facts relating to the history and uses of plants. another feature also which has rendered it of great to the student of botany: it contains a very exten duction to the study of cryptogamic plants. The au ever was too fond of mere verbal classification, and laid the whole work with divisions and subdivisions confuse than enable the student to discover th matter which the work otherwise contains.

Mr. Burnett was latterly too much occupied with ing out this great work to devote himself to origina That he was capable of this is however proved by published from time to time in the 'Journal of S Art.' These papers are on various departments history, comparative anatomy, and zoology, as well The most important are those devoted to physio tany. In one of these he endeavoured to prove tha been called the respiration of plants, viz. the ta carbonic acid, and the giving out of oxygen, wa digestive process of vegetables. He also ende prove that there was a true respiratory process car plants; that they not only took in carbonic acid an oxygen, but that they also took in oxygen and gav bonic acid. This theory has been adopted by m nental chemists and botanists, but it appears tha rational exposition of the phenomena of plants carbonic acid in the dark, is not that it results respiratory process, but from the giving out of car which, being taken in by the roots, is not decompo want of the light of the sun. He also contribut papers on medical subjects to the 'Lancet' and Gazette,' and was an active member of the W Medical and the Medico-botanical Societies.

As a lecturer, Professor Burnett was remarkab fluent and graceful style, and his amiable manne him the respect and esteem of his pupils. He d summer of 1835, of pulmonary consumption. He his lectures till within a few days of his death. executed by Behnes, and subscribed for by his been erected to his memory at King's College.

BURNING. [ARSON, P. C.]

BU'TEA, a genus of plants belonging to the nat Leguminosæ, named after John, Earl of Bute, a gr of botanists. It has a campanulate calyx, 5-toothed superior teeth approximate and almost connected; with a lanceolate spreading vexillum; keel incur in length to wings and vexillum; the stamens diadel legume stipitate, compressed, flat, membranous, in 1-seeded at the apex; the seed large, compress species are natives of the East Indies. They ar trees, with pinnately trifoliate leaves with racem scarlet flowers.

B. frondosa has pubescent branches; roundish, inate leaflets, velvety beneath; the corolla four times ngth of the calyx; the calycine teeth rather acute. It ative of mountainous districts in Hindustan. A red juice from this tree, which when evaporated is found to con- incipally of tannin, and is brought into the market under ame of East India Kino. The juice of the common s, which in this species are too inches long, gives to a bright yellow colour similar to gamboge. This pro- is also possessed by the dried petals. 'The lac insects equently found upon the smaller branches of the tree, hether the natural juices of its bark contribute to im- : their red colouring matter has not been determined.' Don.)

uperba has glabrous branches; roundish ovate, obtuse ts, velvety beneath; the corolla four times the length of calyx; calyx teeth acute. It grows on the mountains of mandel. It resembles the last species, but is larger in all arts. It yields the same kind of juice. There are two r species described.

G. Don, *Gardener's Dictionary*; Lindley, *Natural tem.*)

UTLER, SAMUEL, D.D., late Bishop of Lichfield, born at Kenilworth, Warwickshire, 30th of January, 4. His father was Mr. William Butler, a respectable bitant of the village. His grandfather had been for r years steward on the estates of Lord Hyde and Lord h. He was educated at Rugby School, and in 1792 was ed at St. John's College, Cambridge. His University r was very successful: besides obtaining three of Sir am Browne's medals, two for the Latin ode and one for reek ode, he was elected in 1793 to the Craven Uni- y scholarship, and, after taking his bachelor's degree, he l the first of the Chancellor's two gold medals that are lly given for classical scholarship; and both in 1797 and he carried off the Members' prize for the best Latin by Bachelors of Arts. In 1797 he had been elected ow of his College, and in 1798 he accepted the ap- nent of head master of Shrewsbury School. In 1802 s presented by the Earl of Clarendon to the vicarage of worth; in 1807, by Bishop Cornwallis, to a prebendal n Lichfield Cathedral; and in 1822 he was made arch- n of Derby. He had taken his degree of D.D. in 1811. r Dr. Butler Shrewsbury School, the reputation of which llen very low, gradually rose to eminence, and he con- l to preside over it till he was promoted, in 1836, to the f Lichfield and Coventry, or, as it is now entitled, of ield, the archdeaconry of Coventry having been annexed me year to the diocese of Worcester. But from that his health rapidly gave way, and his death took place at shall Castle, Staffordshire, the episcopal residence, on 4th of December, 1839. He had married, in 1798, iet, fifth daughter of the Rev. Dr. Apthorp, vicar of don and rector of St. Mary-le-Bow; and he left a son two daughters.

r. Butler is stated to have been much beloved in private his public distinction was derived from his able conduct is school and his steady profession of liberal or Whig ties. Of his literary works the most considerable is his ion of Aeschylus, which he was selected to superintend the Syndics of the Cambridge University Press about the e when he removed to Shrewsbury, and the first of the four volumes of which appeared in 1809, the last in 1816. It lso printed in 8 vols. 8vo. This edition, in which the t is that of Stanley, has not much reputation. The first me soon after its appearance was made the subject of an cle in the 'Edinburgh Review,' which immediately drew m Butler 'A Letter to C. J. Blomfield, containing Re- rks on the Edinburgh Review of the Cambridge Aeschylus,' . 1810. The article is in the Edinburgh Review, No. 29 r October, 1809), pp. 152-163. A more elaborate cri- m on the second volume appeared in the same work, No. 8 (for February, 1812), pp. 477-508. The writer of a very atory memoir of Dr. Butler in the 'Gentleman's Maga- ne' for February, 1840, to which we are indebted for the s of his life, states that he had long cherished a design of editing Aeschylus, and had collected MSS. for that pur- e. The new edition, it is added, 'would, no doubt, have n far superior to the former one.' Dr. Butler's best known k is his 'Sketch of Modern and Ancient Geography, for e of Schools,' 8vo., which originally appeared at Shrews- y in 1813. His laudatory biographer in the 'Gentleman's gazine' describes this performance with singular candour in following terms:—'Since frequently reprinted, having become a standard book on the subject, and produced large profits; but it is not a work of much value.' It certainly is not; and the two Atlases which the author afterwards published to be used along with it may be described in the same terms. Dr. Butler's other chief publications on classical literature were an 8vo. volume, which he produced in 1797, entitled 'M. Musuri Carmen in Platonem, Is. Casauboni in Jos. Scaligerum Ode; accedunt Poemata et Exercitationes utriusque Linguae;' and 'A Praxis on the Latin Prepositions,' 8vo. 1823 (afterwards three times reprinted). He wrote the Latin language rather fluently than well. He also translated Lucien Bonaparte's poem of 'Charlemagne,' in conjunction with the Rev. F. Hodgson; and he published sundry single sermons at divers times. Dr. Butler left a valuable collection of Aldine editions, and also of Greek and Latin MSS.

BUXBAUMIA, a genus of plants belonging to the natural order of Mosses. It was named in honour of J. C. Buxbaum, a German botanist, and author of a catalogue of plants of the environs of Halle, and who first detected this moss in Russia. Buxbaumia has an oblique gibbous capsule; a double peristome, the outer consisting of numerous filiform, erect, jointless teeth, the inner a plaited membranous cone; a minute mitriform calyptra. There is but one species of this singular genus, the *B. aphylla*. This plant is destitute of apparent leaves, and looks more like a fungus than a moss. The ascending axis of the plant is in fact reduced to a little conical bulb, which is clothed with minute scales, and these Mr. Robert Brown pointed out as its leaves. From the bulb arises a red tuberculated seta bearing the reproductive organs, which is about an inch high. It is a very rare plant. It was first discovered in Great Britain at Sproughton near Norwich. It has also been found in three or four localities in Scotland.

(Smith's *English Flora*, vol. v.)

BUXTON, SIR THOMAS FOWELL, was born on the 1st of April, 1786, at Earl's Colne, in Essex, the residence of his father Thomas Fowell Buxton, who died while his children, three sons and two daughters, were young. Thomas Fowell, who was the eldest son, was sent by his mother, who was the daughter of Mr. Hanbury, of Coggeshall, in Essex, to the school of Dr. Charles Burney, at Greenwich, son of Charles Burney, Mus. Doc., and brother of Madame D'Arblay. He was afterwards intrusted to the private tuition of a clergyman in Ireland, and subsequently became an under-graduate of the University of Dublin. He left the university at the age of twenty-one, and on the 13th of May, 1807, married Hannah, the fifth daughter of the late John Gurney, of Earlham Hall, near Norwich, by whom, besides other children, he had a son, born in 1812, who has succeeded to the baronetcy.

When he was about twenty-six years of age, he made a speech at the Mansion-House, London, before a large meeting assembled to inquire into the best means of relieving the extreme distress of the population of Spitalfields. About the same time he distinguished himself by a speech at one of the earliest of the public meetings of the Norfolk and Norwich Auxiliary Bible Society. His attention was next directed to the state of prison discipline; he inspected many prisons, and before he was thirty had written and published an Inquiry into the subject, illustrated by descriptions of several gaols, and an account of the proceedings of the Ladies' Committee in Newgate, the most active of whom was Mrs. Elizabeth Fry, his sister-in-law.

In 1818 Mr. Buxton was elected member of parliament for the borough of Weymouth, after a severe contest; and in 1819 he took a prominent part in the debates in the House of Commons, on prison discipline, the amelioration of the criminal law, and the suppression of lotteries. About the same time he devoted his efforts towards the abolition of the barbarous practice of burning widows in India. He continued to represent the borough of Weymouth for nearly twenty years, during which period he was assiduous in the performance of his parliamentary duties (few members so frequently addressed the House), nor did he ever slacken or deviate in the assertion and working out of those benevolent principles with which he started in public life.

On the 15th of May, 1823, Mr. Buxton brought forward a resolution condemning slavery 'as repugnant to the principles of the British constitution and to Christianity.' Soon afterwards he supported the motion of Sir James Mackintosh for mitigating the rigour of the criminal law. In 1833, when Lord Stanley brought forward a motion for the abolition of slavery, he bore a prominent part in the discussions.

In 1837 he lost his election for Weymouth, and from that time refused to be again put in nomination for that or any other borough. In 1840 the crown conferred on him the dignity of a baronet. Though afflicted with ill-health, he did not cease his benevolent exertions, and was one of the chief promoters of the well-meant but disastrous expedition to the Niger in 1841. He died on the 19th of February, 1845, at his residence North-Repps Hall, near Aylsham, in Norfolk, at the age of fifty-nine.

Sir Thomas Fowell Buxton was a man of singularly commanding person; he was more than six feet four inches in height, and of a fine expression of countenance. As a speaker, he was somewhat heavy both in style and delivery, but the influence arising from his high character always secured him a respectful attention. He had no great reach of intellect or imagination, and little of the fervour of an orator, but in collecting facts his industry was untiring, and in exhibiting and commenting upon them, he was zealous to pertinacity, reiterating his attacks till his object was attained or found to be unattainable. He was a brewer, of the firm of Trueman, Hanbury, Buxton, & Co., and exceedingly rich. His charities were numerous, and, when the occasion seemed to him to require it, munificent.

(*Daily and Weekly Newspapers*, &c.)

BYRGIUS, JUSTUS, or JUST BYRGE, a mathematician and artist, chiefly distinguished by the reputation of having been the first person who invented or, at least, gave indications of numbers corresponding to logarithms. He was born in Switzerland, in the year 1552, and was long attached to the observatory which had been built at Hesse-Cassel by the Landgrave William IV.; at this place he made celestial observations, which were afterwards published by Snell; and he was occasionally employed in making mathematical and astronomical instruments. He is said to have invented an instrument similar to that which is now called proportional compasses; and to have constructed a pendulum clock in the year 1600, which is above fifty years before the application of a pendulum to an instrument for measuring time was made by Huyghens. He executed for the landgrave a celestial globe or orrery, which was afterwards purchased by the emperor Rudolph II., who appointed him his instrument-maker.

His brother-in-law Bramer states that on the death of the landgrave he went to reside at Prague; and that in 1632 he returned to Cassel, where he died in the following year. Dithmarsus, who designates himself a pupil of Byrgius, observes that the latter had studied neither Latin nor Greek; and Kepler describes him as an indolent and reserved man, who withheld his discoveries from the public.

Dithmarsus ascribes to his tutor the discovery of two rules for resolving spherical triangles; one, when the three sides, and the other, when two sides and the angle contained between them, are given; and he considers them as much more simple than any which had been used before that time. He states also that Byrgius had discovered a method of dividing any given angle into equal parts, or into parts having given relations to one another; and he adds that by such means he could compute with great facility a table of sines, either in natural or in *logistic* numbers. These last are supposed to be a species of logarithms, and as the work of Dithmarsus was published in 1588, or twenty-six years before the 'Canon' of Napier [NAPIER, P. C.], it is possible that Byrgius may have preceded the latter in the time of the discovery. This is directly asserted by Kepler, in the preface to the Rudolphine Tables, where it is also observed that the *Logistic indices* (the accents by which minutes, seconds, thirds, &c. of a degree are designated in sexagesimal arithmetic) led Byrgius to the discovery of logarithms similar to those of Napier. If this assertion be correct, it may be presumed that Byrgius formed, by the means obscurely indicated in the work of Dithmarsus, two series of numbers, one series in an increasing arithmetical progression, and the other in a decreasing geometrical progression; like the denominations above alluded to, and as in the original table of logarithms computed by Napier.

From Montucla ('Histoire des Mathématiques,' tom. 2) we learn that there is a passage in a work on Perspective by the Bramer above mentioned, in which it is stated that Byrgius had published at Prague, in 1620, a table containing two series, one in arithmetical and the other in geometrical progression; it is added, that he entertained the idea of publishing several of his works, among which was a table of sines to every two seconds of the quadrant, and that the distress occasioned by the Thirty Years' War prevented the design from being put in execution. An imperfect copy of the tables first mentioned was in the possession of M. Kasta
from this it was found that the logarithmic number
with zero, and increased constantly by 10, while the
numbers began with 1, and formed an increasing ge
progression. Bramer infers from the publication of th
that his brother-in-law was in possession of logarith
before Napier had made the discovery; but, as the
Mirificus' was published six years earlier than that ta
inference is unfounded. It may be admitted howe
the circumstances mentioned by Dithmarsus, that tw
years before the publication of Napier's book, Byrgiu
knowledge of the properties of the numbers called
mic in facilitating arithmetical computations; but it
appear that he was the first to form a table of them
purpose.

It is remarkable that Kepler, who himself co
table of logarithmic numbers, does not mention By
the year 1627, when he states that the latter had di
logarithms similar to those of Napier. Previously
time he always spoke of Napier as the inventor, an
discovery as the most useful that had been made sin
bers were known. If therefore Kepler, in Germany
knowledge of the discoveries of Byrgius from the
Dithmarsus, it cannot be supposed that the latter h
its way to Scotland, or that its obscure indication
Napier to the discovery which has immortalized his

BYRRHUS, a genus of Coleopterous insects, insti
Linnæus, belonging to the family of *Byrrhidæ* as de
Leach. The beetles composing it are more or less glob
convex, and sericeous: the club of their antennæ
jointed, and is gradually thickened to the extremit
elytra cover the body, and the animal can so contra
as to pack them in cavities adapted for their receptic
under side of the body. This it does when alarmed, si
death. The larva of the common species, the *Byrrh*
popularly known as the Pill-beetle, is of an elong
narrow, with a large head, the dorsal plate of the
ment large, and the two terminal segments larger
others. Seven British species of *Byrrhus* are enum
Mr. Stephens in his 'Systematic Catalogue of British
For an account of the family see Westwood's 'Int
to Entomology.'

BYSSA'CEÆ, a tribe of Cryptogamic plants,
some botanists to the importance of a distinct ord
others refer it either to the Lichens or the Fungi,
bute its genera amongst the various orders of Cry
Fries places this group of plants in the natural
Lichens, with the following definition:—'Aerial, p
constantly growing, with a filamentous texture; co
solid fibres (either few, or several glued together
common bark), unchanged and permanent. Fru
homogeneous, growing externally and naked.' Ma
species of plants referred to this order are of a very
nature, and particular states of decaying vegetable
mal matter have undoubtedly been described as pl
placed amongst them. These forms of matter, what
may be, are not less interesting to the naturalist tha
came under his definition of a plant.

The genus *Rhizomorpha* [RHIZOMORPHA, P. C.] is
by most botanists to Byssaceæ. Some authors have
their specific vegetable character. The various f
found on decaying wood, and in mines, pits, and dar
In the coal-mines of Dresden they form objects
interest on account of their phosphorescence. Mr. E
quoted by Burnett in his 'Outlines of Botany,' gives
lowing account of this phenomenon, in one of the
mines:—'I saw,' he says, 'the luminous plants here
derful beauty; the impression produced by the spe
shall never forget. It appeared, on descending i
mine, as if we were entering an enchanted castle
abundance of these plants was so great, that the r
walls and the pillars were entirely covered with th
the beautiful light they cast around almost dazzled
The light they give out is like faint moonshine, so
persons near each other could readily distinguish their
The lights appear to be most considerable when the
ture of the mines is comparatively high.' One of the
Rhizomorpha cinchonarum, is found on the cinchona
commerce, and is a sure indication of their worthle
Another species of Byssaceæ, *Himantia cinchonarum*
is an evidence of the subputrescent state of the barks o
it is found. *Racodium* is a genus referred by Frie
group of plants. The *R. cellare* is a common plant

it forms a kind of tapestry on the walls and g the casks and bottles with a tunic resembling appearance the skin of a mouse. *Hypochnus* ound on the decaying bark of trees. When s used for medicinal purposes, they should be nfit for use, as this plant indicates incipient

Monilia and *Aspergillus* are sometimes referred The species of these genera, with many others, known by the name of mould on various sub- ULDINESS, P. C.] *Monilia penicillata* is com- on plants in herbaria. The various forms of e found on all kinds of decaying substances. *A.* blue mould which forms on cheese, lard, bread, a value to cheese, and its colour is often imitated dealers by sticking brass pins into the cheese, formed from the pins giving it the colour of

species of the old genus *Byssus* are distributed genera. *B. Iolithus*, the violet-scented byssus, is p red colour on boarded buildings, old pales, and s, on rocks in mountainous countries, and on ow called *Lepraria Iolithus*. It is not less re- its violet scent than its red colour. [SNOW, RED, e is another plant, *Chroolepus Iolithus*, which was included under the *Byssus Iolithus* of older writers. *Byssus cryptarum* forms the genus *Tophora* of recent writers. Several species of Tophora have been named. They do not, however produce spores, and by some they are supposed to arise from the germination of the spores of ferns and mosses arrested in the rudimental state. The *Leprariæ* are sometimes referred to Byssaceæ, but they seem to be the commencing point of the organization of true lichens. They have a thallus resembling a scurf which is formed of sporules. They are very common on decaying timber of all kinds.

The cells of the leaves of many plants during decay assume a variety of forms which have been described as cryptogamic plants under the genera *Phyllerium*, *Erineum*, *Grumaria*, *Taphria*, &c. Many of these so-called plants are meteoric productions; 'on one occasion they are said to have suddenly overrun all the leaves of pines on the side next the wind in the neighbourhood of Dresden; on another, on the 29th of August, 1836, to have in an instant spread over the sails and masts of a ship at Stockholm; and Fries is disposed to consider the cobweb-like matter that overruns the grass in the mornings of spring and autumn of this nature, and not of animal origin.' (Lindley.)

(Lindley, *Natural System*; Burnett, *Outlines*; Smith, *English Flora*.)

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Note.—Since the article Bewick was printed off, two or three errors have been pointed out by one of his pupils. In line 5 of the article, for 'ci
town.' In col. 2, line 11, read thus: 'In 1797 Thomas published the *first volume* of his "History of British Birds;"' and add, at the end of the pa
'The *second volume* was published in 1804.' In col. 2, line 18, for 'by his son Robert and other able pupils,' read 'by his pupils.' Robert was
engraver on wood. In col. 2, line 22, for 'and his "British Fishes,"' read 'and vignettes for his "British Fishes," which work was never publish

C.

AB, or CABRIOLET. [Hackney-Coach, P. C. S.]

A'CCIA, GUGLIELMO, commonly called MON- LVO, from Moncalvo near Casale, the place of his abode, born at Montabone in 1568. He was one of the best co painters of the seventeenth century, and is one of the t celebrated of the Piedmontese painters. There are still eral of his works in Milan, Pavia, Turin, Novara, Mon- vo, Casale, and other cities of that part of Italy. The rch de' Conventuali alone, at Moncalvo, contains almost allery of Caccia's works in oil; they are very light in our, but faint in effect, and in design frequently remind us ongly of the works of Andrea del Sarto, especially in his ly Families and such pieces. He is reported to have died with the Carracci, a fact which Lanzi considers very probable, and he says that if Caccia studied in Bologna at , it must have been from the works of L. Sabbatini, prior the Carracci; but he accounts for his similarity of style with t master, from a picture by Soleri in Casale, from which may have acquired it, as their styles are very similar. Ber- rdino Campi also painted in a very similar style. Caccia's t works in fresco are in the church of Sant' Antonio Abate Milan, and in San Paolo at Novara. His masterpiece in oil considered the Deposition from the Cross, in the church of n Gaudenzio at Novara: there are also two excellent altar- eces by him in the churches of Santa Croce and Santa Teresa Turin; and two others in a chapel of San Domenico at hieri. Some of his landscape backgrounds are in the style Paul Bril: he died about 1625.

Caccia instructed two of his daughters in painting; Orsola addalena and Francesca, by whom there are many works in ncalvo and the vicinity: the pictures of the elder, Orsola, marked with a flower; those of Francesca with a bird. sola founded the Conservatorio delle Orseline (Ursulines) Moncalvo: she died in 1678. Francesca also survived her ther many years: she died aged fifty-seven.

(Orlandi, *Abecedario Pittorico;* Lanzi, *Storia Pittorica*, &c.)

CAGNO'LA, LUIGI, the most distinguished Italian archi- of the present century, his fame having been extended ugh Europe by the finest monument of its kind in modern es, the magnificent Arco della Pace at Milan, was born in city in 1762, of an antient patrician family, one of whose estors, Ariprando Cagnola, was consul of Milan in 1117. the age of fourteen, Luigi was sent by his father, the rchese Gaetano Cagnola, to the Clementine College at me, where he applied himself entirely to the study of archi- ture, in consequence of the impression made upon him by ancient edifices of that capital. On being recalled home, was sent to the university of Pavia in 1781, in order to dy jurisprudence; but, although he was so far from neg- ting his studies that he obtained honorary prizes, his sion for architecture was insuperable, and he resolved to vote himself exclusively to that art, notwithstanding that ofessional practice in it was deemed somewhat derogatory one of his rank and station. In this determination he was con- med by finding that a better taste in architecture was begin- g to prevail at Milan, where it had been introduced by Pier- rini [Piermarini, P. C. S.], Polacchi, and Cantoni [Can- ni, P. C. S.].

Cagnola at first accepted some official post under Count ilczek, then governor of Milan, but did not continue in very long, being compelled, by the ill-health of his father, take upon himself the chief management of the family affairs. fter that he filled for two years the office of *Viro Probo*, a rt of ædileship in the civic government of Milan. At length ventured to put forth three different designs for the Porta rientale, then about to be erected at Milan, and of which Pier- rini had been appointed architect by the Archduke Ferdi- and, at that time governor of the city. At the archduke's re- est Cagnola's designs were submitted to him; yet, though ey were approved, that by Piermarini was adopted, as being ore economical. He now engaged the services of a very clever rspective draftsman and water-colour artist, named Aureglio, d undertook a series of illustrations of the ancient baths of ximian, near the church of San Lorenzo, published under e title of 'Antichità Lombardico-Milanesi;' and he was terwards employed by the government (1812) to secure om further ruin the sixteen noble Corinthian marble columns which constitute the chief remains of that monument of antiquity. The death of his father, in 1799, devolved upon Cagnola an important share in public affairs, when, besides being one of the state council, he was attached to the army-commissariat in the Austrian service, which office he discharged with prudence as well as ability. On the change of the government by the establishment of the Cisalpine Republic, he withdrew from Milan, and spent about two years at Verona and Venice, where he found sufficient and congenial occupation in studying the architectural treasures of those cities. Soon after his return, he erected in 1802 a noble villa for the brothers Zurla, at Cremi, near Vajano, which while in progress was nearly destroyed by an earthquake that did great damage throughout the district; but he repaired the mischief done to the works with so much skill and promptitude as thereby to acquire increased fame. It was about the same period that he designed the magnificent *catafalchi* for the funeral obsequies of Archbishop Viconti, the Patriarch Gamberi, and Count Anguissola, published in folio, 1802. On the marriage of the Viceroy Eugène Beauharnois with the Princess Amelia of Bavaria in 1806, he was called upon to erect another grand temporary structure, which, like the preceding ones, would now be known only by engravings, had it not proved the prelude to his most celebrated achievement in his art; for such was the admiration excited by the arch constructed of wood on that occasion, that it was determined to perpetuate it in marble. Accordingly, the first stone of the Porta del Sempione, or, as it is now called, the Arco della Pace, was laid October 14, 1807. The political changes which afterwards took place threatened to put a stop to the work altogether, when it was not advanced beyond the piers of the arches. Almost the idea of its being ever completed had been abandoned, when, on his visit to Milan, the late emperor (Francis I. of Austria) ordered the works to be resumed; and from that time they were prosecuted without interruption, so that Cagnola saw the whole structure terminated, or very nearly so, before his death, exclusively of some of the decorative sculpture and bronze figures. With the single exception of the Arc de l'Etoile at Paris, the Arco della Pace is by far the largest as well as most magnificent structure of the kind in modern times, and in its general mass it is equal to, even if it does not somewhat exceed, the largest of the antient—the Arch of Constantine; it being 78 feet English wide, as many high, and about 27 feet deep.

Another public monument by him at Milan, which is greatly admired, is the Porta di Marengo, otherwise called Porta Ticinense, an Ionic propylæum, whose two fronts consist of a distyle in antis, consequently of three open intercolumns, and the two sides or ends are filled in with an open arch. Nothing can be more simple or even severe in character than this structure, for it is one of the very few things in Italian architecture which decidedly approximates to the taste of Grecian antiquity; but not even the desire of novelty could induce Cagnola, any more than the rest of his countrymen, to shake off his allegiance to Vitruvius and Palladio. Compared with Athenian examples his Ionic capitals look meagre and insignificant, and seem at all events to require a necking, which, by adding to the mass of the capitals, would have reduced the lankiness of the shafts.

The Campanile at Urgnano in the Bergamasque territory, begun in 1824 and finished in 1829, exhibits more of design and composition than the preceding. It is a circular tower of three orders, Doric, Ionic, and Corinthian, upon a square rusticated basement, each order consisting of eight half-columns, and between those of the Corinthian order are as many open arches. Above this last rises an additional order of Caryatid figures supporting a hemispherical dome: the entire height from the ground is 58 metres, or 190 English feet. The elevation of this Campanile is engraved in the 'Ape delle Belle Arte,' Rome, 1835. Among other works executed by Cagnola are the chapel of Santa Marcellina in the church of S. Ambrogio, at Milan; the church at Concorrezzo; the façade of that at Vivallo; and the church at Ghisalba in the Bergamasque. This last, which was not completed till after his death, in 1835, is his noblest work of the kind, and is a rotunda of the Corinthian order, with a portico of fourteen columns, but whether octastyle in front, or how the remaining columns are disposed, is not specified. The interior has sixteen columns of the same order. Besides those which were carried into execution, Cagnola produced a great number of designs and *projects*, in several of which he gave such free scope to his invention and *grandezza* of ideas, as to render their adoption hopeless: such, for instance, was that for an Hospitium on the summit of Mount Cenis, with no fewer than one hundred and ten columns, eleven English feet in diameter—to which may be added his designs for a senate-house and a magnificent triumphal bridge. In fact, he derived no inconsiderable share of his celebrity from his designs of that class; wherefore it is greatly to be regretted that he neither edited them himself, nor directed by his will that both they and those of all the buildings he executed should be given to the world in the form of a splendid architectural publication—a record of his labours that would have made them universally known. However, he indulged his taste without regard to cost in improving or nearly rebuilding his villa at Inverigo near Milan, which occupied him during the last years of his life, and which he directed to be completed by his widow. One noble interior feature of this palatial villa is a magnificent central rotunda erected on what was originally an inner court.

Cagnola died of apoplexy, August 14th, 1833, at the age of seventy-one. There is a portrait of him in Förster's 'Bauzeitung' for 1838, with an accompanying memoir, to which we are indebted for some of the particulars in this article. Among those of Cagnola's pupils who have since distinguished themselves are Peverelli, Bianchi (architect of the grand church of San Francesco di Paula at Naples), Vergani, Gillardi, and Dordone.

CAKILE, a genus of plants belonging to the natural order Cruciferæ, to the suborder Lomentaceæ and the tribe Cakilineæ. In addition to the accumbent cotyledons of the tribe, it has an angular pouch composed of two 1-seeded indehiscent joints, the upper joint deciduous with an erect seed, the lower one persistent, seedless, or with a pendent seed. The species are smooth, fleshy, glaucous, annual branched herbs, with pinnatifid or toothed leaves. Racemes of flowers opposite the leaves, and terminal with filiform bractless pedicels.

C. maritima, Purple Sea-rocket, has the joints of the pouch 2-edged, the upper one with two teeth at the base, the leaves fleshy, pinnatifid, somewhat toothed. The flowers are of a purplish colour. It is a native of Europe, along the sea-coast from Sweden and Lapland to Gibraltar: it is also found on both sides of the Mediterranean. It is a native of Great Britain, on the sea-coast. This plant had at one time a reputation as a cathartic, but it is not employed at the present day. There are three other species of Cakile named: *C. Ægyptiaca*, *C. Americana*, *C. equalis*. They are all pretty annuals, and may be easily cultivated. The seeds may be sown in spring or autumn, and they should be treated as other hardy annuals.

(Babington, *Manual;* Don, *Gard. Dict.*)

CALA'DIUM, a genus of plants belonging to the natural order Aroideæ, and to the tribe Caladieæ. The flowers are monœcious, and the calyx and corolla are absent; the male flowers have many-celled peltate anthers, disposed in a spike at the end of the spadix; the female flowers have the ovaries inserted at the base of the spadix, no style; the fruit is a 1-celled berry with many seeds. A great number of species of this genus have been described. They are frequently cultivated in this country for the sake of their spotted stems and neat green leaves, which are rarely disfigured by any of the accidents which affect other stove-plants. They have the same general appearance as the species of Arum, and also resemble them in physical and chemical properties.

C. Seguinum, Dumb-cane, is a caulescent suberect plant with oblong cuspidate leaves, and the spadix shorter than the oblong spathe. This plant is a native of South America and the West Indies. It grows to a height of five or six feet. It secretes an acrid poison, so that when any part of the plant is chewed the tongue swells and the power of speech is lost. It is on this account called Dumb-cane. Sir William Hooker, in his 'Exotic Flora,' relates the case of a gardener who incautiously bit a piece of Dumb-cane: 'his tongue swelled to such a degree that he could not move it; he became utterly incapable of speaking, and was confined to the house for some days in the most excruciating torments.' The juice is stated to impart an indelible stain to linen. Notwithstanding its poisonous nature, P. Browne says that, in common with the Arum ovatum, its stalk is used to bring sugar to a good grain when it is too viscid, and cannot be made to granulate with lime alone. In the districts where it grows the natives use a decoction of the stem as a bath and fomentation in d
the rootstock is used in obstinate constipation and
standing gout. The negroes also use it as an a
disiac.

C. sagittifolium, Brazil Cabbage, is stemless, with
acuminate leaves, the spadix shorter than the spathe
ovate-cucullate. This plant is a native of the West I
is called by the French Chou-de-Bresil, and by the
Essbare-Arum. In appearance it resembles Arum
and is used for the same purposes. Both the leaves
stock of this plant are eaten. The leaves are boiled
as coleworts; the rootstock is not considered so gr
cacy as the leaves. Of all the eatable Aroideæ, th
to be the most extensively cultivated. It is fou
East and West Indies, in China, Japan, New Ze
the South Sea Islands. When raw the rootstock
certain amount of the poisonous secretion of the fa
like the potato, has an acrid unpleasant flavour whic
disappears in cooking. The leaves are very soft and
from being covered with a fine silky hair, and in ma
are used instead of plates and dishes.

C. esculentum resembles the last: its leaves ar
cordate, and its spathe ovate-lanceolate. It is also
South America, and is cultivated on account of
contained in its rootstock. It possesses similar pro
the last.

C. arborescens is a poisonous species, though n
lent as the Dumb-cane. Merat says that it was for
for wetting the mouths of negroes as a punishment
misdemeanors.

(Loudon, *Cyclopædia of Plants;* Lindley, *Natur*
Burnett, *Outlines of Botany;* Bischoff, *Medicini*
maceutische Botanik.)

CALAMINTHA, a genus of plants belongi
natural order Lamiaceæ, and the tribe Satureinea
the apices of the stamens connivent under the upper
corolla; the anther-cells at length divergent, conn
triangular; the upper lip of the corolla straight, near
lower patent trifid; the calyx 2-lipped and 10-
throat hairy; the flowers whorled, axillary or spik
genus was constituted by Moench, and contains seve
which were placed under *Thymus* and *Clinop*
Smith, in *Melissa* by Bentham, and one in *Acinos*
Koch in his 'Flora Germanica' follows Moench,
Babington in his 'Manual of British Botany.' The
species of this genus, common and well-known plan
Britain.

C. Nepeta, Lesser Calamint, Cat-mint, Balm or F
has leaves ovate, obtuse, serrated, pale beneath, short
calyx subcampanulate, obscurely 2-lipped, teeth
the same shape, the upper ones slightly shorter; nut
almost smooth; cymes dichotomous, many-flowered
not a common plant, and is found on dry banks.
strong aromatic smell not unlike that of penny-ro
pungent taste. Cats are said to be fond of the smell,
its name cat-mint. An infusion of the leaves is rec
as a tonic and stimulant in flatulence and colic. Th
other species possess the volatile oil which is fou
whole order, and hence they all have a more or les
medicinal action.

C. officinalis, Mountain Balm, Common Calamint
Calamintha, Smith; *Melissa Calamintha*, Benth
broadly ovate, rather acute, slightly serrated leaves,
both sides, seated on longish stalks; the calyx tubul
cose in front, distinctly 2-lipped, teeth of the upp
angular, of the lower twice as long and subulate; nuts
covered with impressed dots; cymes scarcely dic
few-flowered.

C. Acinos, Basil Balm, or Basil Thyme (*Acinos*
Persoon; *Acinos thymoides*, Moench), has ovate,
acute leaves with revolute margins; tubular gibb
distinctly 2-lipped, the upper lip with short triang
the lower one with subulate teeth, all converging in
is found in dry gravelly places, and in corn-fields t
Europe.

C. Clinopodium, Wild Basil, Bed-foot (*Clinop*
gare, Smith), has ovate obtuse leaves, rounded belo
crenate; whorls equal, many-flowered; bracts
as long as the calyx. Common in dry bushy
Europe; it is also found in America, but has prob
introduced there.

(Babington, *Manual;* Bentham, *Labiatarum*
Species.)

IIS, a very celebrated Greek sculptor, of the fifth ore Christ. Neither his native place nor the of his career is known; he was however con- ith Phidias, but probably his senior in years, as Cicero and Quintilian, who probably expressed opinion, notwithstanding the general excellence of ere was a hardness in his style. He worked in es, in marble, in bronze, and ivory, and as an en- ld. He was also very famous for his horses, in says, he was without a rival.

ks by Calamis are mentioned in antient writers, atin; but one in particular claims attention. This o of the Servilian gardens at Rome, mentioned by y some supposed to be the Apollo Belvedere of at Rome. This supposition however completely he criticisms of Cicero and Quintilian upon the mis, for this work, so far from being hard, would ely delicate for any male character below a

made two other statues of Apollo: the Apollo (Deliverer from Evil), which Pausanias saw at l the colossal Apollo, made for the city of Apol- icum, and which, according to Strabo, was brought Lucullus, and placed in the Capitol. Junius and posed that Pliny and Pausanias speak of the but it is not at all probable that a work which in Pliny's time would be in Athens in the time . This inconsistency has been pointed out before; ve been misled by the opinion, and it seems to ed the idea which Visconti and Flaxman have t the Apollo Belvedere and the Apollo *Alexikakos* are the same, or at least that the former is a of the bronze original by Calamis. Sillig sup- e statue mentioned by Pausanias must have been ecause it was placed in the open air; this does wever, as many of the antient Greek marbles were open air. It was dedicated in honour of Apollo ivery of Athens from the plague, in Ol. 87. 4 during the Peloponnesian war. It is the latest lamis mentioned, and must have been made at or four years after the death of Phidias. His k which is noticed is a pair of bronze horses boys, for the triumphal car of Onatas, placed by , the son of Hiero, at Olympia, in Ol. 78. 2 (467 nmemoration of Hiero's victory at the Olympic ve years after the battle of Marathon.

so, in his description of Panthea, has recourse Calamis. He takes some of Panthea's charms e of Sosandra by Calamis, which he mentions 'Hetærean Colloquies' as a paragon of beauty. works by Calamis are mentioned by antient an Æsculapius at Corinth, a Victory at Elis, a l a Mercury at Tanagra, a Venus at Athens, mon at Thebes, Hermione at Delphi, &c.

ist. Nat. xxxiii. 12; xxxiv. 8; xxxvi. 4; Pau- ; Lucian, *Imag.* 6, *Dial. Meretr.* iii.; Cicero, Quintilian, *Inst. Orator.*, xii. 10; Strabo, vii. s, *Catal. Artificum*; Sillig, *Catal. Artificum*; *pochen der Bildenden Kunst*, &c.)

ITES, one of the most frequent and charac- era of fossil plants. It is found abundantly, but ely, in the carboniferous system of strata, and ge- the sandstones and shales which alternate with mites Suckovii occurs in most European and Ame- ells. Calamites arenaceus occurs in the bunter We have found traces of a calamites in the red of Worcestershire.

ITES. [Coal-Plants, P. C.]

IO'PORA, the generic title applied by Gold- y Palæozoic corals, for some of which Lamarck he name of Favosites.

IRE GROSSIER, the coarse calcareous build- Paris, which, geologically speaking, is coeval with ay of the basin of London, and contains many ells. These constitute the types of the Eocene es of Mr. Lyell.

OLA, an extinct genus of Brachiopoda, which he Palæozoic strata, and especially in the middle lceola sandalina occurs in this position in the Eifel Devon.

LATING-MACHINES. Before computers had at proficiency in performing arithmetical opera- e pen, machines by which the results of such operations could be obtained by inspection were in almost constant use: the Roman abacus, which continued to be employed in the south of Europe till the end of the fifteenth century, and, in England, to a later period, consisted of counters moveable in parallel grooves or on parallel wires, and having the different denominations units, tens, hundreds, &c., according to the grooves in which they were placed. Thus a counter in the first groove represented 1, while a counter in a groove corresponding to it represented 5; and a counter in each of these expressed together 6. A counter in the second groove denoted 10, while one in a groove corresponding to it denoted 50, and one in each expressed together 60; and so on. The Romans had also machines of the like kind which were applicable to duodecimal arithmetic. The form and use of an abacus similar to the Schwan-pan of the Chinese is described under Abacus, P. C. An account of the prismatic rods invented by Napier for the performance of arithmetical operations is given under Napier's Bones, P. C.; the nature and use of the logarithmic scales, under Sliding Rule, P. C.; and under Saunderson, P. C., is a short account of the machine invented by that mathematician for enabling the blind to make computations.

The celebrated Pascal constructed, it is said, when only 19 years of age, a machine for executing the ordinary operations of arithmetic; and as it has a resemblance, though faint, to the machine invented by Mr. Babbage, it may be proper to give a brief description of it in this place.

It was an assemblage of wheels and cylinders; and on the convex surfaces of the latter were the numbers with which the operations were to be performed: these operations consisted chiefly in the addition and subtraction of sums of money having the denominations of livres, sous, and deniers, for which may be substituted pounds, shillings, and pence; and to those denominations the numbers were adapted. Extending round the convex surface of the first cylinder on the right hand of the machine, and one above the other, were the two series,

0, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
11, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10;

the first of which served for the subtraction and the other for the addition of pence; the cylinder being turned in the same direction for both operations. Upon the surface of the next cylinder on the left were the two series,

0, 19, 18, 17, 16 1
19, 0, 1, 2, 3 . . . . . . 18:

serving for the like operations on shillings: and on the left of this last were several cylinders, about each of which were the two series—

0, 9, 8, 7, 6, 5, 4, 3, 2, 1
9, 0, 1, 2, 3, 4, 5, 6, 7, 8;

and these were used for operations with pounds, or with any numbers in the decimal scale.

Attached to the axles of the first cylinder was a wheel having on its circumference 12 teeth, on that of the second, one having 20 teeth, and on the axle of each of the other cylinders was a wheel having 10 teeth; and before an operation commenced, the zeros of the numbers in the first or second series above, on all the wheels, were brought by hand to the front of the machine.

As an example of the method of using the machine, let it be required to add together the following sums of money:—

£8 9*s.* 8*d.*
4 15 6

By means of a pointer the wheel connected with the first cylinder on the right is to be turned till the eighth tooth, and under it the number 8 on that cylinder, are brought to the front; in like manner the number 9 on the second cylinder and 8 on the third are brought to the front: thus the series of numbers in the fronts of all the cylinders exhibits the first of the above sums of money. Then, by means of the pointer, the first wheel and cylinder on the right hand are to be turned till the sixth tooth (after the eighth) comes to the front, when the cylinder having, from its first position, performed on its axle one revolution and $\frac{2}{12}$ of another, the number 2, representing 12+2, or 1*s.* 2*d.*, appears in front. Now, by the construction of the wheel-work, one complete revolution of the first wheel and cylinder on the right hand causes the wheel and cylinder on its left to turn one-twentieth part of a revolution; by which means, in this example, the number 9 being already in front of the latter cylinder, the number 10 is now there: thus the one shilling obtained by the addition is, as it were, *carried*. The second wheel and cylinder being now turned by means of the pointer till the fifteenth tooth, after the tenth, is brought to the front, the number in front of the cylinder below is 5, representing 20+5, the cylinder having made $1+\frac{5}{20}$ revolutions from its first position; there is thus obtained 1*l.* 5*s.* One revolution of the second wheel and cylinder causes the next, towards the left, to make one-tenth of a revolution; and thus the 1*l.* is *carried*, so that the number in front of the third cylinder is now 9 instead of 8. This third wheel and cylinder are next turned by means of the pointer till the fourth tooth, after the ninth, is brought to the front, when there appears on the cylinder below it the number 3, representing 10+3; and the next cylinder on the left, in front of which was previously zero, has now 1, which may thus be said to have been *carried*.

It is easy to be perceived that, if several sums of money were to be added together, each wheel should be continually turned so as to bring to the front a number of teeth expressed by the number in the line next below that which had been previously added; and that no attention need be paid to the numbers thus, successively, brought to the front of the machine till the last, or lowest, line has been added.

The subtractions are performed exactly in the same manner as the additions, by means of the numbers in the upper series on the cylinders.

Where many sums of money are to be added together, some time may be saved by the use of such a machine; but the processes for subtraction, multiplication, and division would be more tedious, and perhaps more liable to error than those which are performed by the pen. A description of the machine may be seen in the ***Encyclopédie Méthodique, Mathématiques***, art. 'Arithmétique.'

Subsequently to the time of Pascal, Leibnitz invented a machine by which arithmetical computations could be made: no account of it appears to have been published; and perhaps all that is known of it is that, by wheel-work, the operations of multiplication and division could be performed without the successive additions or subtractions which would be required if Pascal's machine were used.

The machine invented by Mr. Babbage, should it be carried on to the extent proposed, would constitute one of the most superb monuments of human ingenuity: it is intended not only to perform arithmetical operations with absolute certainty, but also to transfer the results immediately to copper-plates, from which any number of copies may be printed without a possibility of error. The principles on which this machine is constructed and the manner of using it are now to be stated; and in so doing all possible brevity shall be used.

In any series of numbers arranged in line or column, if the difference between the first and second, between the second and third, and so on, be taken, there will be formed a line or column of what are called first differences: if the difference between the first and second, between the second and third, and so on, of these last numbers be taken, there will be formed a line or column of what are called second differences. Proceeding in like manner to form third, fourth, &c. orders of differences, there will at length be found a series of differences which are either constant, or to a great extent are very nearly so. Thus, taking the series of numbers in the column N below, the several orders of differences will be as in the succeeding columns; the numbers in the sixth column being constant:

N	$\Delta^{\text{i.}}$	$\Delta^{\text{ii.}}$	$\Delta^{\text{iii.}}$	$\Delta^{\text{iv.}}$	$\Delta^{\text{v.}}$
243					
	781				
1024		1320			
	2101		1230		
3125		2550		600	
	4651		1830		120
7776		4380		720	
	9031		2550		
16807		6930			
	15961				
32768					
&c.	&c.	&c.	&c.	&c.	&c.

Now it is evident that, having any one of the numbers in the first column, and the numbers corresponding to it in the several columns of differences; all the succeeding numbers of the series may be found by mere additions. It may happen however that while the numbers in the original series increase, the numbers in some of the columns of difference may decrease; and then, in forming the terms of the series, subtractions might take place: in such a case, the arithmetical complements of the numbers to be subtracted being taken, the operations may still be performed by additions only.

The machine accomplishes these additions by the m ments of a number of cylinders having on the convex su of each the series of numbers 1, 2, 3, 4, 5, 7, 8, 9, 0; the operations are thus distributed: by the first, the addit are made; and by the second, there is introduced the 1 w should be carried to the *ten's* place every time that the su two numbers is greater than 10.

Let it be imagined that there are several vertical axle each of which are several cylinders one above another; that these axles with their cylinders are capable of b turned by wheelwork, so that any one of the ten figures be made to stand on the face of the machine, and immedi under a fixed index. Let it be further imagined that, w the moving power (the hand of the operator applied t winch) has made one quarter of a revolution, the first, th fifth, &c. axles may turn, causing the cylinders on them make parts of a revolution or allowing them to remain at r as the case may be, while all the cylinders on the seco fourth, &c. axles remain at rest. Again, when the mov power has made the second quarter of a revolution, let it imagined that certain, only, of the cylinders on the fi third, fifth, &c. axles make one-tenth of a revolution, so th whatever figure be under the index of each of these mo cylinders, the next figure, in increasing order, may be brou under that index; the cylinders on the second, fourth, &c. ax still remaining at rest. Let it next be imagined that, when moving power describes the third quarter of a revolution, cylinders on the second, fourth, &c. axles describe parts o revolution or remain at rest, the cylinders on the other ax being unmoved: and lastly, when the moving power described the fourth quarter of a revolution, let certain cy ders only on the second, fourth, &c. axles make one-tenth a revolution, the other cylinders remaining at rest. The may be understood that by the first and third of these motio numbers are added together; while, by the second and four 1 is carried to each figure which ought to be increased consequence of a sum of two figures being greater than 10.

As an example, let it be required to obtain the numbers the series in the first column above, beginning with 3125.

Let the figures composing the number be under the ind in front of the cylinders on the first vertical axis, towards left hand; and the figures composing the several orders

N	$\Delta^{\text{i.}}$	$\Delta^{\text{ii.}}$	$\Delta^{\text{iii.}}$	$\Delta^{\text{iv.}}$	Δ'
3	4	2	1	0	0
1	6	5	8	6	1
2	5	5	3	0	2
5	1	0	0	0	0

differences in front of the cylinders on the other axis, tow the right, as in this second table. Then the moving po being turned one quarter of a revolution, each cylinder in first, third, and fifth vertical columns will be turned thro as many tenths of a revolution as are expressed by the num in front of the cylinder immediately on its right hand: t the cylinder having 3 in front (at the top of the first verti column) will move through four-tenths of a revolution, the number 7 will be brought under its index in front. T cylinder having 1 in front (in the first vertical column) be turned through six-tenths of a revolution, which will br 7 under its index in front; and so on.

The numbers in front of the whole machine will now st thus:—

N	$\Delta_{\text{i,}}$	$\Delta^{\text{ii.}}$	$\Delta^{\text{iii.}}$	$\Delta^{\text{iv.}}$	Δ'
7	4	3	1	0	0
7	6	3	8	7	1
7	5	8	3	2	2
6	1	0	0	0	0

By the addition (in the preceding table) of 5 in the t column to 8 in the fourth, there should be produced whereas 3 only appears under the index of the cylinder the third column of the present table), therefore 1 must *carried*. The operation of carrying is performed by action of the moving power in the second quadrant o revolution; and, in the present example, this does not more than turn the cylinder marked 3 (in the first line, t column) through one-tenth of a revolution, which brings the front of that cylinder. The reader may now imagine 3 to be effaced, and the number 4 introduced in its place.

Now the moving power turning through the third qu of a revolution, the cylinders on the second and fourth a le to turn through as many tenths of a revolution as ressed by the figures on the cylinders immediately on ght hand: thus the cylinder marked 4 in the second of the last table will turn through four-tenths, and ement will bring to its front the number 8: the cylin- ked 6 will be turned through three-tenths of a revo- which will bring to its front the figure 9, and so on. mbers in front of the machine will now stand thus:—

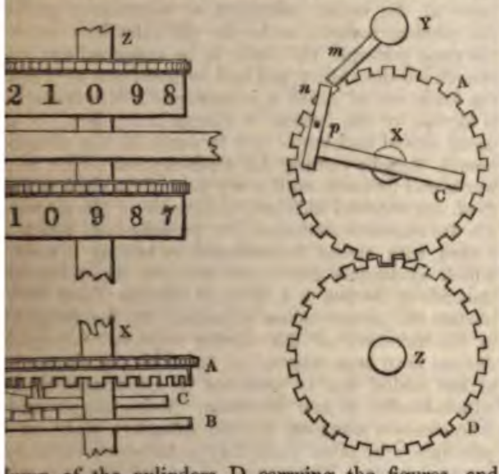
N	$\Delta^{\text{i.}}$	$\Delta^{\text{ii.}}$	$\Delta^{\text{iii.}}$	$\Delta^{\text{iv.}}$	$\Delta^{\text{v.}}$
7	8	4	1	0	0
7	9	3	5	7	1
7	3	8	5	2	2
6	1	0	0	0	0

moving power turning through the fourth quadrant form the operations of carrying; and, in the present , the cylinder marked 9 will turn one-tenth, which (for 10) to its front; this causes another carrying, cylinder marked 8, in the same column, will turn one- which brings 9 to its front. The cylinder marked 1 fourth column will turn one-tenth on account of the from the cylinder 5 below it, which brings 2 to its nd the machine will stand thus:—

N	$\Delta^{\text{i.}}$	$\Delta^{\text{ii.}}$	$\Delta^{\text{iii.}}$	$\Delta^{\text{iv.}}$	$\Delta^{\text{v.}}$
7	9	4	2	0	0
7	0	3	5	7	1
7	3	8	5	2	2
6	1	0	0	0	0

operation is now completed: the number succeeding the series is 7776; and the like operations being per- with the instrument in the present state, the next will be obtained in the first column. It has been that the instrument has only six axles carrying cylin- it it is evident that, if a number consisting of more places of figures were given, or were to be produced, number of axles would be necessary.

ve it not in our power to do more than give the fol- ery general notion of the mechanism by which these le movements are produced. Immediately behind



lumn of the cylinders D carrying the figures, and ical plane perpendicular to the front of the machine, ical axle X which carries, opposite to each cylinder, izontal wheels A and B, and between them a move- t C, also in a horizontal position: these two wheels able of being connected with or disconnected from , so that they may or may not turn with the latter. per wheel A is furnished with teeth, standing out ally from the rim, and these work in the like teeth about the cylinder D carrying the figures, so that the , when it turns with its axle, may be said to drive nder. It is also furnished with teeth which are per- lar to its lower surface in the manner of an inverted wheel. The bolt C, which is under this wheel, and hrough the axle, is capable of being moved a short horizontally; it is provided, near its extremity, with tooth *a* standing perpendicularly above its upper and with a pin *b* perpendicularly below its inferior And the lower wheel B carries a wedge or inclined

Behind the wheels on the axle X is another axle Y, which is also in a vertical position: this carries a projecting bar or finger *m* which revolves horizontally when the axle is made to turn by the action of the moving power. During its revolution it meets, at a proper place, one extremity of a lever *n* which is capable of turning on a pivot at *p*: that extremity being displaced, the extremity of the opposite arm presses against the end of the bolt C in the axis X and causes the upper pin *a* to enter between two teeth of the crown-wheel A. This wheel is thus fixed to its axle so as to be compelled to turn with the bolt; and the horizontal teeth of the wheel, consequently, cause the cylinder D carrying the figures to turn on its proper axis Z. Such is the nature of the mechanism that, while the moving power describes the first and the third quadrants of its revolution, the cylinder D might make a complete revolution; but, in general, the cylinder is to make only as many tenths of a revolution as are expressed by the figure in front of the next cylinder on its right hand; and therefore the bolt is to be withdrawn from the crown-wheel when such part of a revolution has been performed. This is accomplished by the pin *b*, which, moving along the wedge or inclined plane *c*, draws the bolt back so that the pin *a* above is removed from between the teeth of the crown-wheel; the latter is thus disengaged from its axle and ceases to revolve: at the same time the cylinder D, with which it is connected by the horizontal teeth, ceases also to revolve. The cylinder remains then at rest till it is moved at a subsequent step in the process. If the cylinder is not to turn while the moving power describes the first and third quadrants, an apparatus provided for the purpose removes out of its place the lever which should press against the end of the bolt.

For every vertical axis carrying cylinders in front of the machine, there is an axle carrying wheels and bolts, and an axle carrying the fingers which lock the bolts: and behind every cylinder is its proper apparatus, consisting of wheels, bolt, and finger.

The process of *carrying*, which takes place when the moving power is describing the second and fourth quadrants of its revolution, is accomplished thus:—a bar or finger revolves on the axle of the lowest cylinder D, for example, in the first vertical column on the left; and, at a proper time, comes against the extremity of a claw which then engages itself between the teeth of a ratchet-wheel connected with the next cylinder above it: both the wheel and cylinder are thus made to turn, but the length and position of the claw are such that the cylinder can only make one-tenth of a revolution, and thus bring to the front a figure greater by unity than that which was there before. When a cylinder has made the movement just indicated, a projecting pin, called a thumb, on the axle of the lower cylinder, touches a trigger which raises, out of a notch in the claw, a hook which retained the latter: a spiral spring then draws back the claw and allows it to fall between the next teeth of the ratchet-wheel without creating any movement in the cylinder; and the apparatus is thus prepared for the next carrying operation which is to take place.

A very ingenious contrivance is also provided in order to produce an equalization of the action through the machine during an operation: this consists in having the *fingers* by which the bolts and claws are moved placed spirally on the several axles, so that they do not act at once but successively in the time that the moving power describes one quadrant of its revolution: and the fingers which cause the bolts to enter between the teeth of the crown-wheels are disposed so that the shooting of a bolt may take place immediately after the action of the fingers which move the claws employed in the carrying process, by which means a *carrying* is allowed to take place when the previous process of carrying has already caused a cylinder, in moving one-tenth of a revolution, to bring 0 (for 10) to the front.

The most remarkable circumstance in this machine is the provision which may be made in it for avoiding errors arising from inaccuracies in the original construction, or from accidental derangements; but as the means of obtaining this end have not yet, we believe, been put in execution, nothing can be said concerning them.

It is proposed by the inventor to apply to the machine an apparatus by which the numbers obtained from the cylinders in the left-hand column may be immediately transferred, by the operation of *punching*, to plates of copper, in order that the results given by the machine might be printed without a possibility of error. A curvilinear bar of metal is to act on an arm of a lever so as to raise it to ten different heights corresponding to the ten figures on the surface of a cylinder; and the opposite arm of the lever is to move an arch carrying ten punches having on them the characters 1, 2, 3, &c. in relief. The plate of copper being below, a bent lever is to press the punch upon the plate, and produce the impression of the figure. The different figures in front of the first column of cylinders may thus be successively transferred to the copper-plate; and the arch and plate being shifted, the set of figures brought in front of the cylinders in the same column, at the next operation with the machine, may be transferred in like manner.

Whatever be the cause that the construction of this superb machine is suspended, the circumstance cannot fail to be a subject of great regret. The portion which has been already executed is now in the library of King's College, London; and we are informed that it is capable of producing tables of the powers and roots of numbers not extending beyond eight places of figures.

A great improvement on the machine above described is contemplated by the inventor; who, with reference to the purposes to which the improved machine can be applied, designates it an Analytical Engine. In Taylor's 'Scientific Memoirs' (vol. iii. art. xxix.) there is given, by M. Menabrea of Turin, a sketch of the properties of the engine; and in the 'Notes' by the Translator of the article there is the following summary of the operations which can be performed by it:—

It will perform the several operations of simple arithmetic on any numbers whatever. It can combine the quantities algebraically or arithmetically in an unlimited variety of relations. It can use algebraic signs according to their proper laws, and develop the consequences of those laws. It can arbitrarily substitute any formula for any other, effacing the first from the columns on which it is represented and making the second appear in its stead. And lastly, it can effect processes of differentiation and integration on functions in which the operations take place by successive steps. It is further stated that the engine is particularly fitted for the operations of the combinatory analysis, for computing the numbers of Bernoulli, &c.

CALDER'ARI, OTTO'NE, a nobleman of Vicenza (where he was born in 1730), to whom that city is indebted for many important additions to its previous architectural attractions, for edifices rivalling those by Palladio himself. In fact, he is fairly entitled to be called the Palladio of the eighteenth century, and that not so much on account of his being a decided imitator of that master, as for adopting all the best qualities of his style and peculiar characteristics of manner, without having his defects. Nevertheless, while Palladio has been almost universally and no less indiscriminately extolled, Calderari has been treated with most unaccountable neglect. Woods makes no mention in his 'Letters of an Architect' of Calderari or any of his buildings either at Vicenza or elsewhere, although he is rather particular in his notices of those by Palladio in that city; neither does Wightwick in his 'Sketches by a Travelling Architect' (in 'Library of Fine Arts'), nor Eustace, nor any other architectural tourist. In his 'Encyclopædia of Architecture' Gwilt preserves the same complete silence, neither inserting his name in the list of architects, nor the large and beautifully executed folio work of his 'Designs' in that of architectural publications. The only testimony to the merits of Calderari which we have met with in any English publication, excepting Cresy's translation of Milizia's 'Lives,' is in a paper in the Quarterly Review, No. 32, on the 'Palladian Architecture of Italy,' where it is said, 'Ottone Calderari particularly distinguished himself by his simplicity and elegance, and his knowledge of the true principles on which the beauty of Grecian (Greco-Italian) architecture depends. The Loschi and Bessaro palaces at Vicenza, and the Seminario at Verona, are noble specimens of his skill'—and likewise of his taste.

Instead of apologising for remarks that will at all events not diminish the interest of this notice, we have to regret that scarcely anything amounting to biography can be collected to append to it. No materials are furnished by Diedo, the editor of his 'Designs,' in the 'Elogio' prefixed to that work, where he styles him 'Il Immortale Calderari.' His enthusiasm for architecture is said to have been first excited by viewing the Basilica of Vicenza by moonlight, which made so powerful an impression upon him that he thenceforth devoted himself to the study, and became, like Burlington, more than a mere 'dabbling amateur' in it, since his renown eclipsed that of many of his professional contemporaries. One
of his earliest recorded works was the casino erect
near Vicenza, in 1772, for the Count Anti-Sola,
very extended front towards the gardens, with terra
the house to the wings. In 1773 he built the sma
Bonini at Vicenza, whose façade has two orders,
Ionic (of five intercolumns), surmounted by an att
decidedly an imitation of Palladio that it says m
count's fidelity to that master than for his own invent
Palazzo Cordellina (1776) at Vicenza, which is est
his editors his 'capo d'opera,' differs very little fro
ceding in the style of its façade, which presents
orders. The Villa Porto at Vivaro, five miles fro
erected in 1778, is a happier specimen of his talent
Doric colonnades between the body and wings, b
screen wall with openings in it, produce much sce
In 1782 he built the Palazzo Loschi at Vicenza, a
order and attic on a rusticated basement; in 1785
Todaro, and also the Palazzi Quinto and Salvi, in
city. Nor was Vicenza alone the scene of his arc
labours, for he designed the beautiful atrium of the
at Verona, and the Villa Capra, at Marano, and
Cocastelli in the Mantuan territory.

Count Calderari belonged to the principal acad
societies in Europe, and was elected by the French
expressly as being 'foremost among the Italian ar
that day;' nor can it be denied that he is entit
admiration of those who hold Palladio to be a
excellence. He died at Vicenza, October 26, 180
éloge was pronounced by Diedo, secretary to the A
Fine Arts, Venice, and the chief editor of his
Architettura,' &c. 2 vols. folio, 1808-17. Though
no portrait of him prefixed to that work, there
Gamba's 'Galleria de' Letterati,' &c., Venice, 182

CALENDERING is a general name applied
cesses of smoothing, dressing, and glazing webs
fabrics of cotton and linen, either to prepare th
operations of the calico-printer, or to impart the
to the goods before they are folded and packed for

The common smoothing-iron affords the simplest
of the process of calendering, and the mangle, whic
quently employed as a substitute for the smoothing
sents another, the operation of which is identical
some of the earlier calenders, or calendering mac
the common mangle, as in the old calenders cons
the same principle, the cloths to be smoothed are
smooth wooden rollers, and laid between two hard
the lower one of which is immoveable, while the up
is formed by the bottom of a large heavy box, is
being moved backwards and forwards in the direc
length, thereby causing the cloth-covered rollers t
wards and forwards until every part of the cloth wra
them has received sufficient compression. In a con
gle the alternate motion of the pressing-box, which
loaded with stones, is produced by turning a win
which alternately winds and unwinds ropes exte
the ends of the box to a drum or cylinder fixed o
obviate the inconvenience occasioned by the freque
in the direction of the motion required, various
devices have been resorted to, by which the alternat
of the loaded box is produced by a continued mo
winch-handle in one direction. Being larger an
than common mangles, the old calenders made on
principle were often worked by a horse-wheel, or
moving power. The process of calendering was
proved by the invention of a machine in which th
is produced between cylinders, instead of between
and flat surfaces, and in which, consequently, the
motion is got rid of, and, also, it is easier to give
and equal pressure. According to the writer of
'Calender' in the 'Encyclopædia Britannica,' the
calendering engine was introduced into this cou
Flanders and Holland by the Huguenots who w
to England by persecution. The rollers or cyli
formerly made of wood; but, as it was found im
overcome the tendency of that material to warp
they are now usually made either of paper or of
The paper cylinders, which form the most remarka
of a modern calender, are formed in the followin
The axis is a strong square bar of wrought-iro
body of the cylinder consists of a great number
pieces of stout pasteboard, each of which has a squ
the centre to receive the axis, and six smaller roun
equal distances from each other, near the perip

g cast-iron plate, of a circular form, but rather smaller the pieces of pasteboard, and perforated in like manner, st put upon the axis, and then a sufficient number of s of pasteboard to form, when compressed, a cylinder of required length. Another cast-iron plate is then added, long cylindrical bolts of wrought-iron, each of which head at one end, and a screw cut upon the other, are nto the six holes near the rim, and passed completely gh the mass of pieces of pasteboard and the end plates st-iron. Nuts being put upon the ends of these bolts, hole is screwed up as tight as possible, after which the ler is exposed to a strong heat for several days in a stove ated chamber. By this process the pasteboard is conbly shrunk, and while it remains hot the nuts are repeatightened up as much as possible. When allowed to e pasteboard is inclined to expand again, while the iron contract, so that the mass of paper of which the cylinder posed becomes almost inconceivably hard and dense. nished by very careful turning in a lathe, by which the of the cylinder is rendered perfectly true, and receives, sequence of its extreme compactness, a very high polish. ylinders, which are used in conjunction with paper cylin the same machine, are made hollow, and, for cases in the application of heat is required, are constructed to receive red-hot rollers or heaters, or to admit steam h a stuffing-box in the axis at one end, and discharge it opposite extremity.

calenders now commonly employed for smoothing and linen goods, contain four or five rollers mounted one another in a strong frame-work of cast-iron, which, s ability to bear the application of heat without warpvery preferable to wood; and, if the object be simply oth the fabrics, the motion of the rollers, which can be o bear against one another with any required degree of e by means of weighted levers, is so adjusted that, their relative diameters may vary, their surfaces travel qual velocity, so that no rubbing contact is produced. ne goods, however, especially those intended for use ehold furniture, and in certain articles of dress, a glazed hed surface, as well as mere smoothness or evenness, is d. Such goods were formerly glazed by hand upon an d table, with a rounded piece of polished flint attached to aratus which enabled the operator to preserve the cloth oper degree of tension, and to rub the flint backwards wards with considerable force over the surface, a small at a time. This process is now far more expeditiously ned with a calender of the ordinary construction, with lition of a series of toothed wheels which cause the rollers e with different velocities, so that the surface of one ub or slide upon the surface of that adjacent to it. By dinary process of calendering, and still more by the use glazing calender, the round threads of which the web posed are flattened, so that, by the diminution of the ices, the fabric is made to appear closer than when it the loom. Lawns, muslins, and other very light transt fabrics are calendered with a very slight pressure, in hine often worked by hand, which has the effect of hing the goods without altering the cylindrical form of hreads.

hen the operation of the calender is intended to finish s for the market, it is immediately followed by folding packing. Dr. Ure describes in the 'Dictionary of Arts,' e 'Calender,' a very complete calendering apparatus in mong the calico-printers of Alsace, to which a self-acting r may be attached at pleasure; and in the article 'Calen' in the 'Encyclopædia Britannica,' are given some curious ils respecting the mode of folding various kinds of goods. r folding, the goods are subject to immense pressure in a rostatic press, by the aid of which they are frequently h up into bales with such compactness as to occupy oned less space then they could do if packed by hand in boxes. e calendering of goods in the process of manufacture is ely connected with the operations of the bleacher and o-printer, but the calendering of finished goods is usually formed by the packer.

ALENDULA, a genus of plants belonging to the natural r Compositæ, the suborder Corymbiferæ, the tribe Cyna, the subtribe Calendulaceæ, the division Calenduleæ. It n involucre of two rows with equal scales; the flowers of ny ligulate, pistilliferous, fertile; the style divided at top two stigmata; the flowers of the disk hermaphrodite, s, the style undivided; the achenia unequal, curved, ed, or muricated.

C. arvensis, Field Marigold, has the achenia cymbiform, muricated, incurved, the outer ones lanceolate, subulate, muricated on the back. This plant is common on the continent of Europe, and is found in immense numbers in some of the vineyards of the Rhine.

C. officinalis, Common Marigold, has cymbiform achenia, all of them incurved, and muricated. This is the *Souci du Jardin* of the French, *Gold-blume* of the Germans, and *Furrancio* of the Italians. Although common enough now in the gardens of Great Britain, and frequently found wild, it is not a native of these islands, and has been introduced from the south of Europe. This plant is a great favourite in gardens, and continues to blossom till the approach of winter. It is often grown in churchyards in this country, and in cemeteries on the Continent, but this practice does not appear to be connected with any superstition. There are several varieties of this plant found in gardens, as the orange-coloured, the lemon-coloured, and the double. It formerly had numerous virtues attributed to it, but independent of the bitterness of the tribe to which it belongs, and a rather more powerful volatile oil than is found in other species of the order, it possesses no active properties. The flowers are used in some parts of the country to give a yellow colour to cheese. In the Clock of Flora of Linnæus, it is said to open its flowers at nine in the morning and to close them at three in the afternoon. *C. pluvialis* has been named from its flowers closing at the approach of rain. The petals of these plants are some times employed to adulterate saffron.

(Loudon, *Encyclopædia of Plants*; Koch, *Flora Germanica.*)

CALLCOTT, JOHN WALL, one of the brightest ornaments, in every sense of the expression, of the British school of music, was born in 1766, at Kensington, where his father carried on the business of a builder. At the age of seven he was entered as day-boarder in a neighbouring school, where he made such progress that he commenced reading the Greek Testament in his twelfth year, when family affairs occasioned his removal, from which period, great and various as were his acquirements, he was self-educated, a circumstance to which, probably, the vigour of his unshackled mind may be attributed. Music, at first his amusement, accidentally became his profession, instead of surgery, for which he was preparing to qualify himself, when the sight of a severe operation so powerfully acted on nerves of remarkable sensibility, that he at once abandoned all hope of succeeding in the healing art, and devoted himself to that of harmony, the study of which he prosecuted without any master; though by a constant attendance at the Chapel Royal, at Westminster Abbey, and many concerts, together with the friendly hints, given in frequent conversation with Doctors Cooke and Arnold, he, no doubt, profited very largely.

He commenced his professional career in the subordinate capacity of deputy-organist of St. George the Martyr, Queen Square; and at about the same time made his first attempt in the composition of that truly national music, the Glee. In 1785, when only nineteen years of age, he appeared as a candidate for the prizes annually given by the Catch Club, and obtained three out of the four gold medals. Among the successful pieces was that masterly composition, 'Oh! sovereign of the willing soul.' Thus encouraged, he followed up with ardour and industry the course so auspiciously begun, and in the following ten years, twenty medals of the same most distinguished and laudable society were awarded to him. We must, however, add, that some of his best productions were either not candidates for prizes, or unduly appreciated by the dispensers of those musical honours.

In 1785, at the early age of nineteen, Mr. Callcott was admitted bachelor-in-music by the University of Oxford. In 1787 he assisted in forming the Glee-Club. In 1790 he took advantage of the arrival of Haydn in this country, and derived considerable knowledge in the higher branch of instrumental composition from that illustrious musician. He advanced to the degree of doctor-in-music at Oxford, in 1790; his exercise was a Latin motet, selected from Isaiah, beginning 'Propter Sion non tacebo.' His 'Musical Grammar' appeared in 1805. About the year 1806, he undertook to deliver lectures on music at the Royal Institution, a task 'most of all others suited to his studies and gratifying to his ambition: but the very anxiety he felt to execute the duty in a manner worthy of himself, rendered his hopes futile, and his efforts unavailing. His mind, long overstrained, now sank at once under the burthens he had so unsparingly laid on it, and he became incompetent to the fulfilment of any of his engagements.' After a seclusion of five years, he rallied for a time, and by avoiding all severe study or exciting occupation, afforded hopes to his friends that his mental powers were permanently restored. This gleam, however, lasted but three years, when he was once more assailed by the most woful of human maladies, and never recovered. He died in May, 1821.

The productions of this original and ingenious composer are too numerous, and indeed too well known, to be particularized here: the choicest of them were, in 1824, collected and published in two handsome volumes, by his son-in-law, Mr. Horsley. The work is enhanced in value by a portrait of the composer, engraved from a painting by his brother (afterwards Sir Augustus Callcott, R.A.), a remarkably strong likeness, in which the ingenuousness and benignity of his disposition, and the strength and quickness of his intellect, are very happily depicted.

Dr. Callcott left a widow, eight daughters, and two sons. One of the latter has already attained considerable distinction in his father's art.

(Horsley's *Memoir of Dr. C.*; and *Harmonicon*, ix. 53.)

CALLCOTT, SIR AUGUSTUS WALL. This very distinguished landscape painter, frequently styled the English Claude, was born at Kensington in 1779, and died in the same place in the close of the year 1844, aged sixty-five. He was the brother of the distinguished composer, Dr. Callcott, and he himself in early life officiated for several years in the choir of Westminster Abbey under Dr. Cooke. He however preferred painting to music, and for some time pursued both studies together, until the success of a portrait which he painted under the tuition of Hoppner, in 1799, and which he exhibited, led him to the final choice of painting as his profession. Very little experience, however, showed him that portrait was not suited to his taste, and in 1803 he devoted himself exclusively to the study of landscape painting. Richard Wilson had adopted a similar course, but notwithstanding his great ability, with very different success.

Callcott was elected an associate of the Royal Academy in 1807, and a member in 1810. For his diploma-picture, he presented a beautiful painting called 'Morning.' In 1837 he was knighted by the Queen; and at the death of Mr. Seguier in 1844, he was appointed his successor as Conservator of the Royal pictures, an office which he held for a very short time, and of no great emolument, yet honourable, and sufficiently valuable to be of very great importance to the venerable painter, who was so enfeebled by long illness, that in the last few years of his life he was unable to undergo the ordinary exertions of his profession. He was buried on the 30th of November in Kensal Green Cemetery, where his wife, Lady Callcott, had been buried two years previously.

Lady Callcott was the widow of Captain Graham, R.N., and was married to Sir Augustus in 1827. She was born in 1788: her maiden name was Mary Dundas. She was the daughter of Captain Dundas, and was married early in life to Captain Graham, with whom she went to India in 1809. She remained in India two years, and visited during that period many of the most remarkable places in that country, and published an account of her travels after her return home. She published at a later period two works relating to Italy, where she dwelt for some time,—'Three Months in the Environs of Rome,' and 'Memoirs of Poussin.' In 1821 she embarked with her husband for South America, but Captain Graham died during the voyage, and was buried at Valparaiso.

After her second marriage she paid another visit to Italy, in the company of Sir Augustus, and turned her attention particularly to art. In 1836 she published her last literary work, under the title—'Essays towards the History of Painting,' which, notwithstanding an unfortunate corruption of names, partly due to the old translation of Pliny by Philemon Holland, and a few other inaccuracies, is a very creditable performance, and considering that it is the only popular work on ancient painting that has hitherto appeared in English, it is a useful contribution to the library of the young student in art.

It is not intended, in this notice, to give a list of Callcott's pictures, nor even a view of his labours. He was for many years a steady and large contributor to the exhibitions of the Royal Academy. His landscapes were generally of small dimensions, and all very similar in style; but most of them are extensive as views and extremely quiet, and strictly belong to the beautiful as a class. He was less extensive in his distances than Claude, being more defined, and, certainly to the true lovers of nature, more pleasing; in his fore-grounds he was more correct and natural than Claude, except in the foliage, especially of large trees: in colour he was perfectly
natural. His works are perhaps more frequently origi
racteristic pictures of certain scenery, as 'Italy,' 'M
'Evening,' &c., than mere views of particular lo
Many of his pictures also have their titles from the
tion of a few figures introduced into them, as 'H
from Market,' 'Waiting for the Passage-boat,' 'The
&c.: he painted also some marine pieces. In 183
in the exhibition a beautiful picture called 'Harve
Highlands,' in which the figures were painted by E
seer, R.A. In 1837 he departed from his usual s
exhibited a picture of 'Raffaelle and the Fornarina
attracted general admiration, and was selected by th
tors of the London Art-Union to be engraved by L
for circulation among the subscribers for the year 184
success of this piece seems to have induced the pa
attempt a work on a much larger scale in the same st
exhibited in 1840 a picture of 'Milton dictating
Daughters,' in which the figures were about the si
the attempt was however a failure; the composition
tremely meagre and commonplace, and the figures, e
one of the daughters, were ill-drawn. With the v
reputation he deservedly enjoyed as a landscape pai
the little experience he had had in figure painting, i
say the least, injudicious to attempt such a work, an
exhibit it. However, as a landscape painter, C
worthy of all praise, and he has earned a reputatio
will ensure his name a place among the greatest painte
department of the art. He was, from the account of t
knew him, not less estimable as a man, than he was m
as an artist.

(*Art-Union Journal*, 1843-1845; *Catalogues of t*
bitions of the Royal Academy; Waagen, *Kunstw*
Künstler in England.)

CALLI'MACHUS (Καλλίμαχος), a celebrate
sculptor of uncertain age, but probably of about the
Phidias. He was apparently an Athenian, though s
him for Corinth, because he is recorded by Vitruvi
inventor of the Corinthian capital. Callimachus is
other hand, supposed to have been of Athens, from
noticed by Vitruvius, and in part by Pliny, and Pausa
the Athenians used to call him Catatexitechnos (
τεχνος, according to the emendation of Sillig, which
just), signifying one who weakens or effeminates an a
sion to the excessive finish by which he greatly injured
and value of his works. Pliny calls him the calumniato
self, and says that he never knew when to leave off
his works; the same fault was found with Protogene

If Callimachus invented the Corinthian capital, thi
stance enables us, as Winckelmann has observed,
degree to fix his time. It must have been before
Olympiad, about 400 B.C., for Scopas then erected a
Minerva, according to Pausanias, with columns of th
thian order at Tegea; and he cannot have been muc
than that date, as his style was so elaborate and
Dionysius of Halicarnassus compares the works of Ca
and Calamis with the orations of Lysias, on account
finish and neatness. Callimachus is also said to h
used the drill in working marble, a fact doubted b
modern critics, who suggest that he may have impr
drill in use, but cannot have been the first to use it in
marble, as it has evidently been used in the hair of
the most antient statues, which, from the other evide
cerning Callimachus, must have been executed lon
his time.

There is a bas-relief in the capitol at Rome, wit
μαχος εποιει engraved upon it, which represents a
three bacchantes and a fawn; and some have suppose
be the same work which Pliny notices as a dance of
virgins by Callimachus. Winckelmann however sup
inscription to be a forgery, or that there must have b
other Callimachus, who lived later than the subjec
notice. The characters of the inscription are, acco
him, too recent; the subjects also are not the same,
work itself is too insignificant to have been single
Pliny or his authority as a production worthy of reco
cording to Pausanias Callimachus was not an arti
highest merit.

(Pliny, *Hist. Nat.* xxxiv. 8. 19; Vitruvius, iv. 1
nias, i. 26; Winckelmann, *Werke*, vol. v.; Sillig,
Artificum; Thiersch, *Epochen der Bildenden Kun*

CALLIPERS. [CALIBRE, P. C.]

CALLI'STRATUS, a Roman jurist, who was w

reign of Severus and Antoninus (1. tit. 19, s. 3 ;
. 3), by whom are meant Septimius Severus and
minus Caracalla. Severus died A.D. 211. Lam-
ander *Severus*, 68), mentions a Callistratus as one
il of the Emperor Alexander Severus ; and this
Callistratus who was writing under Severus and

s is one of the Jurists from whose writings Justi-
was compiled [Justinian's Legislation, P. C.] :
Callistratus from which the excerpts in the Digest
re—six books De Cognitionibus ; six books of the
nitorium ; four books on the Jus Fisci ; three
stitutiones ; two books of Quaestiones. It ap-
istitutiones being mentioned as one of the works
is, that he was one of those Roman jurists who
ional treatises, such as Gaius.

RICHE, a genus of plants, the type of the na-
allitrichaceæ. The flowers are without calyx or
two bracts at their base ; one stamen ; two
2-lobed and imperfectly 2-celled ; the styles 2,
fruit dry, separating into 4 indehiscent carpels.
figured a deciduous calyx belonging to this genus.
ave been described. Four of these are natives
ain. They are water-plants with smooth leaves,
n by the name of Water-starworts. *C. verna* is
agnant waters and slow streams. *C. platycarpa*
ıud or in shallow water ; seldom, and then appa-
dent, in deep water. *C. pedunculata* is found in
l Babington has described a variety, *C. p. sessilis*,
d in lakes. *C. autumnalis* is found in streams,

ı. *Manual of British Botany.*)

RIS. [Thuja, P. C.]

A (from καλλύνω, to make beautiful), a genus
nging to the natural order Ericaceæ. It has a
ıbranous coloured calyx, longer than the 4-cleft
corolla, surrounded by four green bracts; 8
dilated filaments; the capsule 4-celled, the dis-
hering to the axis; the valves opening at the
and separate from them. There is only one
genus, the common heath (*C. vulgaris*). It is
shrub with small, sessile, closely imbricated,
, arranged in four rows, each leaf having two
at the base, and nearly or quite smooth. The
flowers varies from a deep red to a white, and
ieties have been named. This plant is common
ıth in Great Britain. The varieties are orna-
planted in the garden. They should be grown
and may be propagated by layers or cuttings
glass.

ı, *Manual of British Botany.*)

ERA, ANGELO, born at Padua in 1699, of a
ılly from Corfu, studied at Venice, and entered
ge the monastery of St. Michele, near Murano,
ged to the order of the Camaldulenses. After
his vows, he was sent to Ravenna to teach theo-
ere finding a rich library at his disposal, and a
l and well-disposed librarian, he acquired a large
ed literary knowledge. At Ravenna he made
with the learned Querini, afterwards cardinal.
ter some years, returned to his monastery of St.
ere he spent the greater part of his remaining
ourite literary studies. He was induced to com-
l selection from the numerous papers which were
arious scientific and philological academies scat-
taly, and which, for want of a common journal,
ried and forgotten in their respective archives.
dertook the task, in which he was assisted by Pier
o, Facciolati, Vallisnieri, Muratori, Manni, and
contemporaries. He began to publish in 1728,
e 'Raccolta d'Opuscoli Scientifici e Filologici,'
ned to appear periodically till 1757, when the
by its fifty-first volume, which contains an index
collection. He resumed it, however, in 1754,
tle of 'Nuova Raccolta d'Opuscoli Scientifici è
hich he carried on to the time of his death, in
hich it was continued by his co-religionist Father
1784, when the fortieth and last volume of this
appeared. The two series constitute an ample
an learning during the 18th century. Amidst
which have only a local and temporary interest,
ny others which are truly valuable, and which
found anywhere else. Calogiera wrote also a kind of literary journal entitled 'Memorie per servire alla Storia Letteraria;' he wrote with Apostolo Zeno in the journal 'La Minerva,' and he also contributed to a new edition of the 'Biblioteca volante' of Cinelli. Calogiera was appointed in 1730 Revisore or book Censor for the Venetian State. He left a voluminous correspondence, which is inedited.

(Lombardi, *Storia della letteratura Italiana nel Secolo XVIII.*)

CALOPHYLLUM (from καλός, beautiful, and φύλλον, leaf), a genus of plants belonging to the natural order Guttiferæ. It has a bractless calyx consisting of from 2-4 unequal coloured sepals; 4 petals (sometimes 2), opposite the sepals; indefinite stamens, free or connected at the base, filaments short, anthers inserted by their base, 2-celled, bursting longitudinally ; the style twisted, crowned by a large capitate stigma, which is usually lobed ; fruit drupaceous, globose or egg-shaped, 1-celled, 1-seeded ; the seeds large. The species are trees, the leaves of which have numerous transverse parallel veins, which give them a very beautiful appearance.

C. Inophyllum has oblong or obovate obtuse leaves, usually emarginate, round branches, loosely racemose flowers, racemes axillary, 1-flowered, usually opposite peduncles. This tree is a native of the East Indies, and often attains a height of 90 or 100 feet. It has large handsome leaves like those of a water-lily, snow-white fragrant flowers, and a fruit about the size of a walnut. When the trunk is wounded, it exudes a yellow viscid juice, which frequently hardens to the consistence of a gum. It is a common plant in Malabar, where it yields fruit twice a year, in March and September, and frequently attains the age of three hundred years. The nuts afford a fixed oil, which is expressed, and used for burning in lamps, for making ointment, &c. This tree is cultivated in Java for the sake of its shade and the fragrance of its flowers. The bark and the exudation are used for medicinal purposes.

C. Calaba, Calaba-tree, has obovate or oblong, obtuse or emarginate leaves ; hermaphrodite or male flowers ; lateral, very short racemes. This plant is a tree 60 feet in height, and is a native of the Caribbee Islands. It has white sweet-scented flowers, and a green fruit something like the cornelian cherry, which contains a white solid kernel. An oil is expressed from the seed for domestic uses and for burning in lamps. The timber is used for various purposes, especially for staves and cask-headings. Lindley says, 'that the true East Indian Tacamahaca is produced by Calophyllum Calaba.' There are however several gums brought into the market under the name of Tacamahaca, of which formerly more was used than at the present day. The *Tacamahaca seu Resina Tacamahaca* of the old Pharmacopœias appears to have been the produce of the *Elaphrium tomentosum* and *E. excelsum*, plants belonging to the natural order Amyrideæ. It is described as a resin of a brown yellow colour, spotted with white, easily broken into pieces, which have a shining fracture, easily melting in the fire, and having a pleasant scent. Cullen says that it was not employed in his day 'as an internal medicine, and as an external I cannot perceive its virtues.' It was used for making plasters as a counter-irritant, for which there are forms in the continental Pharmacopœias at the present day. There is however another form of Tacamahaca brought to Europe, called Tacamahaca in shells. It has got this name from being collected in little gourd-shells. This is the true East Indian Tacamahaca, which is collected from *C. Inophyllum* in the East India islands, and from *C. Tacamahaca* in Madagascar and the Mauritius.

(Bischoff, *Medicinisch-pharmaceutische Botanik ;* Loudon, *Encyclopædia ;* Don, *Gard. Dict. ;* Lindley, *Nat. System.*)

CALOTYPE. [Photography, P. C. S.]

CALVERT, DENIS, sometimes called FIAMMINGO, a distinguished painter in his time, especially in landscape, was born at Antwerp about 1555. He settled early in Bologna, and studied there, first with Fontana, and afterwards with Sabbatini, with whom he visited Rome and assisted in some works there. Sabbatini had more influence upon the style of Calvert than Fontana, who however taught him the value of perspective, in which Fontana excelled. After a stay of some time in Parma, Calvert returned to Bologna and opened a school there, which became very celebrated and was numerously attended ; he is said to have taught 137 painters. His school was unrivalled in Bologna until the establishment of the famous school of the Carracci, which in a few years completely superseded it. Some of the greatest scholars however of the Carracci had been students in the school of Calvert, as

Domenichino, Guido, and Albani, three of the most famous of the Bolognese painters.

Calvert died at Bologna in 1619. He is spoken of with great respect by Malvasia and other Italian historians of art. There is nothing peculiarly Flemish in his style; his pictures, of which there are still several in Bologna, are generally well coloured, and strictly in an Italian style of design: in landscape he was superior to any of his Bolognese contemporaries. His masterpieces are a St. Michael in the church of San Petronio, and a Purgatory alle Grazie.

(Malvasia, *Felsina Pittrice*; Lanzi, *Storia Pittorica*, &c.)

CALYCOPHYLLUM (from κάλυξ, calyx, and φύλλον, leaf), a genus of plants belonging to the natural order Cinchonaceæ. It has the limb of the calyx truncate or bluntly 5-toothed, one of the teeth expanded into a petiolate coloured membranous leaf; the corolla campanulate or funnel-shaped with a 5-plaited limb; five stamens, the filaments rising from the throat free, the length of the corolla; the anthers oval, exserted; the style ending in 2 reflexed stigmas; the capsule dehiscing at the apex, oblong, 2-celled, many seeded; the seeds fixed to the linear placenta, imbricate, oblong, girded by a very narrow membranous wing. The species are small smooth trees, with opposite glabrous leaves, short stipules, and flowers disposed in axillary and terminal dichotomous corymbs.

One of the most remarkable species of this genus has been lately described by Sir Robert Schomburgk as a native of British Guiana. There are several genera closely allied to Calycophyllum, as *Mussænda Pinkneya*, &c., in which one of the teeth expands into a petioled and coloured leaf of a membranaceous texture. In the species discovered in Guiana the bract-like expansion of the calyx, has a rose colour, and as the flowers are very numerous the whole tree assumes the colour of the rose. In describing the discovery of this plant, Sir Robert says, 'Let imagination convey you to the great garden of nature in Guiana, clothed in tropical exuberance; and among those productions of a congenial sun and fertile soil, figure to yourself trees from forty to fifty feet high presenting a mass of leaves the colour of our favourite flower, from a deep pink to the lightest rose, and perhaps your fancy will assist you to form some idea of the picture I beheld at one of the valleys of the river Rapunnuni, where a high mountain on the river's left bank turns its bed boldly to the east. The banks of the stream and the steep side of the hill were alike covered with trees clothed with rose-coloured leaves; and only on a near approach could the shining green leaves and the spikes of flowers of a velvety blue be discovered."

This plant is called by its discoverer after Lord Stanley, *Calycophyllum Stanleyanum*. The wood of the tree is very hard. It is very bitter to the taste, and, like the rest of the order, is probably febrifugal.

(Hooker; *London Journal of Botany*, 1844.)

CALY'MENE, the generic title, in Brongniart's classification of Trilobites, for the species of Crustacea allied to the well known Dudley fossil Calymene Blumenbachii. [TRILOBITES, P. C.]

CALYSTE'GIA (from καλύξ, 'calyx,' and στέγω, 'to cover'), a genus of plants composed of species formerly included under Convolvulus. It is distinguished by two large bracts which enclose the flower. It has a 5-parted calyx, a campanulate 5-plicate corolla, one style, a 2-lobed stigma, globose or terete lobes, a 2-celled ovarium with 2 ovules; the capsule only 1-celled from the shortness of the dissepiment. The species are lactescent, glabrous, twining or prostrate herbs, with solitary 1-flowered peduncles.

C. sepium, Great Bindweed, has sagittate or cordate, very acute leaves; lobes truncate, entire, cordate, keeled; acute bracts longer than the calyx, but one half shorter than the corolla; the peduncles square, sepals acute. This is the Convolvulus sepium of older botanists. The genus Calystegia is not adopted by Koch, Babington, and other botanists. It is a native of Europe in hedges, and is found in Great Britain very common. It possesses apparently the properties of the genus Convolvulus. Haller and Withering state that the expressed juice of the root may be used as a substitute for scammony. It is sometimes called German Scammony. In doses of 20 or 30 grains it has been recommended as a hydragogue cathartic in dropsies, by Mason Good.

C. Soldanella, Sea Bindweed, has trailing, glabrous, rather fleshy leaves, reniform, entire, or a little angular; peduncles angular, angles, winged; bracts large, ovate, blunt, mucronate, generally shorter than the calyx. It is a native of many parts of Europe on the sea-coast, and also some parts of Asia. The
young stalks are sometimes eaten pickled. The ju
mature plant is however a cathartic.

Several other species of this genus are described.
Convolvuli, they are elegant plants in blossom, and
most easy culture. They may be propagated by
the root or by seeds. The C. Soldanella should now
be watered with salt water.

(Don, *Gardener's Dictionary*.)

CAMBIA'SO, LUCA, sometimes called LUC
DA GENOVA, a very celebrated Italian painter
and in oil, was born at Moneglia near Genoa, on S
day, in 1527. He was instructed by his father Gi
painter of considerable merit, and distinguished him
when a boy, and though he is not known to hav
Rome in his youth, his best works have many of the
of the great Roman masters. After a long and ho
career at Genoa, where he was without a rival, he
1583, to Spain with his son Orazio, and L. Tavaron
his pupils, to assist him in some works which Ph
had commissioned him to execute in the Escurial.
biaso was invited to Spain by Philip II. to supply th
of his old friend and fellow-labourer G. B. Castello
gamo, who died in Madrid in 1579. Cambiaso and
executed several paintings together in Genoa.

Cambiaso executed several works in the Escur
largest of which was an immense fresco of Paradise,
ing a vast number of figures, arranged as the monks
on the ceiling of the choir of the church of San L
He received 12,000 ducats for this picture, yet it
him only fifteen months; it was however in the op
Mengs much inferior to his best works in Genoa: th
position is formal and bad, but for this the monks
held responsible. The oil painting of John the
preaching in the Wilderness, also in the Escurial, is
of his Spanish works: he died at the Escurial in 15
Philip greatly regretted his loss. He was called
by the Spaniards. He was a painter of surprising
and power; Armenini compared him with Tintorett
painted however latterly with great negligence, a
stance which some attribute to a disappointment
The story is this: his wife died, and Cambiaso invi
sister to keep house for him and take care of his c
he however soon became desperately in love with her,
he could not marry her by the law of the Roman ch
set out for Rome to pray the Pope Gregory XIII. fo
dulgence. He took two pictures with him as pre
his holiness, which were accepted, but his prayer
cisively rejected, and he was ordered to remove th
from his house. This refusal had a great effect up
and rendered him indifferent in his works, which he
forth executed merely for money. When he was i
however he again encouraged the hope of inducing th
to grant his prayer, through the intercession of Phi
but when he alluded to the subject to some of Phili
fidential advisers, he was told by them that the bare
of the matter to the king would ensure his immedi
grace, which so depressed him that it induced a desp
which paralyzed his intellect, and in a few weeks bro
his death, in his fifty-eighth year.

Cambiaso's masterpiece is considered the Martyrd
St. George in the church of San Giorgio at Genoa.
Rape of the Sabines, in Terralba near Genoa, is also
nificent and celebrated work. His portrait by himse
the Florentine gallery: several of his works have be
graved.

(Soprani, *Vite de' Pittori*, &c.; Cean Bermudez,
cionario Historico, &c.)

CAMBRIAN ROCKS. Professor Sedgwick
length established, in North Wales, beyond a doubt,
portant fact, that beneath the slates and flags of Denbig
which belong to the upper Silurian strata, occur in th
wyn Mountains and in the vicinity of Bala other
containing lower Silurian fossils, to the extent of
thousand feet in thickness. In South Wales the pro
the Geological Survey, under De la Beche, has est
the fact of very considerable thicknesses of partially
ferous rocks beneath the Llandeilo (or lowest Silurian
of Murchison. By these labours we perceive that the
zoic forms of organization descend, in Wales, many t
feet below the lowest recognised Silurian strata, and
therefore enabled to present the subjoined view of the
clatures separately proposed by Sedgwick and Mu
in connection with the terms used in this work:

LOWER ALÆOZOIC STRATA. [P. C.]		Upper Silurian. (Murch.)	Ludlow rocks. Wenlock rocks.
	Cambrian Strata. (Sedgw.)	Lower Silurian. (Murch.)	Caradoc rocks. Llandeilo rocks.
		Groups yet to be named.	—————— ——————

HYPOZOIC STRATA OF CUMBERLAND AND SCOTLAND.

hus it appears that the Cambrian strata are not exactly equi- lents of the lower Silurians, but include a great range of her strata below those originally defined by Mr. Murchison. iewed however without reference to nomenclature, the Cam- ian and lower Silurian rocks form one grand type, and may haps deserve to be ranked as one great 'Protozoic' system.

CAMELI'NA, a genus of plants belonging to the natural ler Cruciferæ, to the suborder Latiseptæ, and the tribe melineæ. It has a subovate pouch, the valves ventricose, th a linear prolongation at the end, which is confluent with persistent style.

C. sativa, Gold of Pleasure, has pear-shaped pouches, in- mediate stem, leaves lanceolate, sagittate at the base, entire denticulate. It has small yellow flowers. Its name is a rlesque on the humble appearance of the plant. Babington mits it into his British Flora, but it is undoubtedly a eign plant, which has been introduced with the seed of x. It is found abundantly in the corn and flax fields of the ntinent, from whence the seed is brought to this country.

C. dentata, is another species frequently found in Great itain, in company with the last, and introduced in the same ay.

CAMPANELLA, TOMMA'SO, born near the town of ilo in Calabria, in 1568, entered the Dominican order and came distinguished for his learning. He applied himself iefly to metaphysics, and followed his countryman Telesio, ho died in 1588 at Cosenza, in his opposition to what was en taught in the schools under the name of Aristotelian ilosophy. Campanella published his first work at Naples, 1591, entitled 'Philosophia Sensibus demonstrata adversus s qui proprio arbitratu, non autem sensata duce natura, phi- sophati sunt, cum vera Defensione Bernardi Telesii.' Phi- sophy was at that time a very dangerous ground for discus- n, as was experienced, among others, by Bruno and Vanini, th natives of the kingdom of Naples, who were burnt alive r their opinions, one at Rome and the other in France. uno GIORDANO, P. C.] The schoolmen, and the monks pecially, raised such a storm against Campanella, that he left s native country. He was accused of sorcery, of being an ept of Raymond Lullus, and of some cabalistic Rabbins. mpanella went to Tuscany, where the Grand Duke Ferdi- nd de' Medici received him with great kindness, and offered m a professorship at Pisa, which he declined. From thence mpanella proceeded to Padua, where he gave private instruc- n to several young patricians of Venice. About this period wrote several works, among others a project of a Christian narchy with a treatise on Church government, addressed to pope, in which he suggested how, with mere spiritual apons, he might bring all Christians within the pale of the urch. Campanella appears in this and others of his works admirer of unity, both in Church and State; he advo- ted a universal spiritual monarchy as well as a temporal one, th acting in unison for a common purpose. He also wrote quisition in Italian, at the request of a senator of Venice, the question, whether the foreign ambassadors at Venice uld be allowed to harangue the Senate in their respective guages. After some years, Campanella left Padua for me, but his papers were seized on the road, and it seems t they found their way to the archives of the Inquisition Rome; but the author remained unmolested for the present. m Rome Campanella returned to his native country, re he lived for some time at Stilo, enjoying considerable brity for his learning, until serious political events came isturb the land. A vast conspiracy is stated to have been hed in Calabria, in which several hundred monks and r clergymen, some bishops, and many barons, were said to implicated, against the Spanish viceregal government, h was one of the worst in Europe. The peasantry were for revolt, being ground down by taxes, and still more he cruel manner in which they were levied. Philip II. pain, who had wielded so long with a strong hand the er of the Spanish crown, was dead, and his successor had inherited his abilities or his firmness. The Count de Lemos was sent Viceroy to Naples by Philip III., and a fresh tax on 'fuochi' (hearths), or families, was imposed. Dissatisfaction became loud all over the country. In August, 1599, two citizens of Catanzaro revealed the plan of a conspiracy, in which Campanella and his brother friar, Dionisio Ponzio of Nicastro, were leaders. It was said that their object was to proclaim a republic, and that they relied upon the Turks for assistance, and had carried on a correspondence with Cicala Pasha, a Turkish Admiral, but himself a Calabrian renegade, who was then scouring the neighbouring sea with his squadron. Such a plan may have been conceived by some person, but that a man of so much information and judgment as Campanella displays in his works, a monk, and an advocate for a universal Christian monarchy, could think of establishing a republic in Calabria by means of Turkish assistance and against the power of the Spanish monarchy, is incredible, and the sequel tends to disprove the charge. The probability is, that he was imprudent in his language, that he expressed himself indignantly against the oppressions of the viceregal government, and that his historical information supplied him with comparisons unfavourable to it. Campanella and Dionisio Ponzio were arrested, together with many more, and sent to Naples, where several of the conspirators, having confessed under torture, were executed. Campanella remained in a dungeon for years: he was put to the torture seven times; five times his trial was begun afresh, but he confessed nothing, or had nothing to confess, and after several years his confinement was mitigated, and he was allowed to see his friends. Charges of heresy were mixed up with political charges against him; he was even accused of being the author of the book 'De Tribus Impostoribus,' which Campanella observes had been published thirty years before he was born. The historian Giannone asserts that Campanella was really a leader of the great conspiracy, which he says was concocted chiefly by monks; but Giannone, like most Neapolitan jurists, was prejudiced against monks and churchmen in general, and he believed the insinuations of the viceregal lawyers. He says that he had seen a copy of the proceedings against Campanella and his fellow-conspirators, but we know what the forms of trial for treason were in those times, and at Naples. Botta, in his continuation to Guicciardini, has followed Giannone implicitly. A search has been lately made in the archives of Naples for the papers relative to Campanella's imprisonment and trial, but nothing has been found. Most of the documents existing of the viceregal judicial administration are of a later date than Campanella's trial; the previous records of the sixteenth and beginning of the seventeenth century are missing. Antonio Serra, a Calabrian, and one of the earliest writers on political economy, was one of the individuals imprisoned on the same occasion as Campanella, and he also was tortured and kept in prison for years. [POLITICAL ECONOMY, P. C.] Campanella enjoyed at one time a glimpse of favour from the viceroy Duke of Ossuna, who loved to converse with him on politics; but when Ossuna was recalled and arrested, on the charge of having intended to assume supreme power at Naples, Campanella became the object of fresh suspicions, and his captivity was made more rigorous. At last, in 1626, he was released from his prison at the pressing request of Pope Urban VIII., who, probably in order to obtain his release, urged that as the prisoner had been charged with heresy and was moreover an ecclesiastic, he ought to appear before the tribunal of the Inquisition. Campanella was therefore sent to Rome, and lodged in the buildings of the Holy Office, where however he was a prisoner at large, and was treated with considerate attention. After three years more, making in all thirty years of confinement, he was allowed his full freedom. He remained for several years at Rome, enjoying the favour of the pope, of many of the cardinals, and other distinguished persons. He published two works in favour of the Papal See and Court: 'Monarchia Messiæ, ubi, per philosophiam divinam et humanam demonstrantur Jura summi Pontificis super universum Orbem.' Jesi, in the Papal State, 1633; and 'Discorsi della Libertà e della Felice Suggezione allo Stato Ecclesiastico,' Ibid. The object of the last work was to show that the people subject to the Papal See were among the happiest in Italy, which was then probably true. These two works having occasioned remonstrances and complaints on the part of the Spanish and other courts, were suppressed, and copies of them are very scarce. He also wrote at Rome a 'Liber de Titulis,' on hierarchical precedence and titles of honour.

Campanella had become very intimate at Rome with the Duke de Noailles, ambassador of Louis XIII., and this intimacy, added to the old suspicions of the agents of Spain, made them cry aloud against the protection granted by the pope to a turbulent friar, whom they compared to Luther. Campanella stood evidently in danger, even in the midst of Rome; so great was then the dread of the Spanish power in Italy, that the pope's protection was deemed insufficient. Noailles proposed to Campanella to take refuge in France, and he sent him off in his own carriage, disguised as one of his attendants, and with letters of recommendation to the minister Cardinal Richelieu. Campanella arrived safely at Marseille, in October, 1634; he saw at Aix the learned Peiresc, who treated him most kindly and provided him with necessaries for the remainder of his journey. At Paris he had a very favourable reception from Richelieu, who conversed with him confidentially on the affairs of Italy, and introduced him to Louis XIII., who granted him a pension. Campanella, worn out by his sufferings, retired to the convent of his order, the afterwards famous Convent of the Jacobins in the Rue St. Honoré, where he died, in 1639.

The works of Campanella are very numerous. The Dominican bibliographers Echard and Quetif, ‘Scriptor. Ord. Prædic.,’ give a long catalogue of his inedited works. Among those that have been published, the following are deserving of notice:—1, ‘Prodromus Philosophiæ Instaurandæ, seu de Natura Rerum, cum Præfatione ad Philosophos Germaniæ,’ Frankfort, 1617. The preface is by Tobias Adami, a learned German, who became acquainted with Campanella in his confinement at Naples. Campanella intrusted him with several of his MSS. 2, ‘De Sensu Rerum et Magia Libri IV., ubi demonstratur Mundum esse Dei vivam statuam beneque cognoscentem; omnes illius partes sensu donatas esse, quatenus ipsarum conservationi sufficit; et fere omnium naturæ arcanorum reperiuntur rationes,’ Frankfort, 1620. This work was composed, as well as several others, by Campanella during his Neapolitan captivity, and was published in Germany by Adami, but the author published a second edition of it at Paris in 1636, which he dedicated to Cardinal Richelieu. Father Mersenne wrote to refute the book as heretical, and Athanasius of Constantinople wrote against it his ‘Anti-Campanella,’ Paris, 1655. 3, ‘Realis Philosophiæ Epilogisticæ Partes IV., cum Tobiæ Adami Annotationibus; accedit Appendix politicus sub hoc Titulo: Civitas Solis, seu Idea Reipublicæ Philosophicæ,’ Frankfort, 1620. The ‘Civitas Solis’ has been often reprinted separately, and translated into various languages. 4, ‘Apologia pro Galileo, ubi disquiritur utrum ratio philosophandi quam Galileus celebrat faveat Scripturis sacris an adversetur,’ Frankfort, 1662. 5, ‘Astrologicorum Libri VI.,’ Lyon, 1629. A second edition was published at Frankfort in 1630, with the addition of a seventh book, ‘De Fato Siderali vitando.’ Campanella had faith in astrology. 6, ‘Atheismus Triumphatus, seu contra Antichristianismum,’ Rome, 1631; and a second edition, with additions, Paris, 1836. 7, ‘De Prædestinatione, Electione, Reprobatione, et auxiliis Divinæ Gratiæ, Cento Thomisticus,’ Paris, 1636. The author discusses some of the opinions of Thomas Aquinas, and supports those of Origenes. 8, Universalis Philosophiæ, seu Metaphysicarum Rerum Libri XVIII.,’ Paris, 1638. 9, ‘Philosophiæ Rationalis Partes Quinque.’ 10, ‘De Gentilismo non retinendo Quæstio unica,’ Paris, 1636. The question proposed is, whether it is lawful to contradict Aristotle. The following works of Campanella were published after the death of the author. 11, ‘De Libris propriis et recta Ratione Studendi,’ Paris, 1642, in which the author speaks of himself, his studies, and his works. It was edited by Naudé, who knew Campanella, and who speaks of him and his imprisonment in his ‘Considérations Politiques sur les Coups d'Etats.’ 12, ‘De Monarchia Hispanica Discursus,’ Amsterdam, 1640. This, perhaps the most remarkable work of Campanella, was written by him during his confinement at Naples. It is an able sketch of the political world of that time, and with reference to the Spanish monarchy, which was then the preponderating power, it showed how that preponderance could be maintained and increased. The author has been compared to Machiavelli, but there is this difference between them, that although Campanella is not very scrupulous as to sincerity and faith in political transactions, yet he reprobates cruelty and persecution, and prefers milder and more humane means. In fact his age was different from that of Machiavelli, and such barefaced atrocities as those of Borgia would not have been tolerated. In many respects the advice which Campanella gives to the King of Spain, especially concerning the internal administration, is very sound. This work made great noise at the time; it was reprinted several times, and was translated into English, and published during Cromwell's
Protectorate: ‘A Discourse touching the Spanish M
wherein we have a political glasse representing eac
lar country, province, kingdom, and empire of the w
ways of government by which they are kept in o
written by Thomas Campanella, and newly transl
English according to the third edition of his book
London, 1654, with a preface by the translator, givin
of Campanella's adventures. The work was reprinted
Restoration, under this title: ‘Thomas Campanella, a
Friar, and second Machiavel, his Advice to the King
for attaining the Universal Monarchy of the World,
larly concerning England, Scotland, and Ireland, how
division between King and Parliament, to alter the
ment from a Kingdom to a Commonwealth, also for
Holland and other seafaring countries, &c., with a p
William Prynne of Lincoln's Inn.' The following
will serve to give some idea of the tenor of the wor
was written towards the end of Elizabeth's reign
opinion is that the King of Spain should do well t
under hand some certain merchants of Florence that
and subtle persons, and that traffick at Antwerp, who
they are not so much hated by the English as the S
are) should treat with some such of the English as
way or other descended from some of the former
England, and should promise each of them severally
of them knowing any thing of what is said to the ot
the possible aid that can be from Spain, for the rest
them to their inheritances. . . . . Let him also send
to King James of Scotland, and promise him that
assist him to the utmost of his power in his getting p
of the kingdom of England, upon this condition, that
either restore there again the Catholic religion, or
that he shall not annoy or any way disturb the Spani
from the West Indies. Again, on the other side,
under-hand labour with the English peers, and other
of the Parliament, and egge them on to endeavour t
England into the form of a republic. The English
are also to be exasperated and put into fears of the
King James and his Scots. . . . . The chiefs of
nobility are also to be dealt with, so that as soon as t
of Queen Elizabeth's death, they should new-model
either into the form of a republic, or else make it int
dom of itself, throwing off all obedience to Englan
promising aids to each of them in particular, and that
the rather, because in that kingdom or island the C
and especially the friars that are of the order of St.
are very greatly esteemed and beloved. There is a
greater agreement and correspondence between the
and the Irish than betwixt them and the English, w
be by reason of the similitude of their manners, o
reason of the clime, and the nearness of these two
one to the other. There are also in Ireland many
persons, and such as have fled their countries, being
are most impatient of government, and yet are good C
and such as may be able to do good service in this
hath been shown already. But this sort of men is
rare to be found, either in England or Scotland also.'
Monarchy, chap. 25.)

Professor Morland has found in the King's Li
Paris several MSS. of Campanella, among others
tive against the Jesuits: ‘Istruzione ai Principi dell
con la quale si governano i Padri Gesuiti, à persuader
tefice Paolo V. e tutti i Principi Cristiani à distr
Compagnia.' There is in the same library a dis
his against the Lutherans and Calvinists. In the
Library at Vienna there is an Italian dialogue of
nella, on the means of convincing of error all the
and sectarians of his time.

In the latter years of his life at Paris, Campane
asked whether Gaston d'Orleans, brother of Loui
should ever reign, as the queen, Anne of Austria, w
less, he gave a sibylline reply: ‘Imperium non g
æternum.' Soon after, Queen Anne proved pregn
the child was Louis XIV. Campanella lived long e
compose a Latin eclogue on the birth of the infa
was his last composition.

Ernest Solomon Cipriani wrote a biography of Ca
Amsterdam, 1705. Brucker and Buhle, in their H
Philosophy, give an abstract of Campanella's ph
Some short Italian poems of Campanella have be
published at Lugano, by Orelli. Adami publishe
his Latin poems.

(Baldacchini, *Vita e Filosofia di T. Campanella*

several inedited letters of Campanella; Tirabos-
della Letteratura Italiana; and the Works quoted
se of this article).

A'NULA (diminutive of Campana, on account of
its flowers), a genus of plants the type of the na-
Campanulaceæ. It has a 5-cleft calyx, the corolla
-shaped, with five broad and shallow segments,
free, the filaments dilated at the base, the stigma
capsule not elongated, 3-5-celled, and opening by
s outside the segment of the calyx. This genus is one
st in the vegetable kingdom, although from time to
mber of its species has been reduced by the formation
eric types. George Don, in the 'Gardener's Dic-
ves descriptions of 153 species, and many more
dded since the publication of that work. Of these
lescribed by Babington as British species. The
Smith were more numerous, but Babington re-
leister's genus *Specularia* for the old *C. hybrida*
carpus hybridus of L'Heritier) and its allies, and
genus *Wahlenbergia* for the *C. hederacea*. The
es of the genus Campanula are *Trachelium* and
, names which were given to it on account of the
fficacy of many of the species in the cure of dis-
the neck and trachea. Hence also the common
oatwort. All the species are herbaceous, with
nnial roots, and the radical leaves differing in form
of the stem. They are natives of the northern
e.

s, Chobs, Okab, is a hispid plant with a thick root,
wered stems, ovate-lanceolate, crenate leaves, lobes
x linear-lanceolate, equal in length to the corolla,
ispid. It is a native of Arabia Felix. Its root is
apid, and contains a considerable quantity of starch.
his account frequently eaten by children, as the
ny other species.

rata, Clustered Bell-flower, has the leaves minutely
rate, the lowermost stalked, ovate-lanceolate, gene-
te at the base, the upper leaves half-clasping,
te, acute; the flowers sessile in terminal and axillary
This is a native of Europe, especially in mountain-
s. In Great Britain it is found in dry pastures on
It is the *Trachelium minus* and *Cervicaria minor*
d Dodonæus. It is often cultivated in our gardens,
number of wild varieties have been described by
De Candolle.

helium, Nettle-leaved Bell-flower, has the leaves
ubly serrate, hispid, the lower one cordate with
upper nearly sessile, ovate or lanceolate, acumi-
rs racemose, peduncles 2-3-flowered; segments of
triangular-lanceolate, entire, erect; the stem erect,
This is a European species. It is found in the
gland, and has large blue bell-shaped flowers. A
this herb was formerly used in disorders of the
the properties of the genus are medicinally inert.

difolia, Hare-bell, Blue-bells, Milkwort, has the
ves cordate or reniform, shorter than their stalks,
linear, the lower ones lanceolate; flowers one or
ose, corolla turbinate, campanulate. It has pretty
s, and is a favourite throughout Europe. In France
Clochette; in Germany, *Weisen-Busch*, and *Grass-*
juice of the flowers makes a very good blue ink,
mixed with alum a green one. The roots of this
may be eaten.

midalis is a glabrous plant with leaves glandular,
e lower ones petiolate, ovate-oblong, somewhat
e stem-leaves sessile, ovate-lanceolate; the flowers
pyramidally racemose, the lobes of the calyx
spreading, the capsule spherical, deeply furrowed.
nous on rocks and walls in Carinthia, Carniola,
tia. From its having been a great favourite
dens of Europe, it has now become naturalized
laces where it was not originally a native. It
en been found wild in Great Britain, though it is
cultivated for the sake of its tall raceme of beauti-
wers. It is in great demand in Holland, where it
l to ornament halls and staircases, and to place be-
ces in summer, for which purpose it is planted in
and trained in a fan-manner so as to hide a large
n the shade it remains in bloom two or three
The art of producing a very large plant is to begin
of a small size, and shift frequently during two
t last the plant occupies a pot of a foot or more in
Rich light soil should be used, but no animal manures or recent dung, as these are very injurious. Cuttings of the roots flower the second and seedlings the third year. *C. carpatica* and *C. grandiflora* may be treated in the same manner.' (Loudon.)

C. Rapunculus, Rampion, has leaves crenate, the radicle leaves oblong-elliptical narrowed into a petiole, the stem-leaves linear-lanceolate, sessile, the raceme few-flowered, the segments of the calyx lanceolate. It is a native of Marocco and Barbary, also of the south of Europe, and extends as far north as Norfolk in England. It has a fusiform thick white root, which looks like a little turnip; hence the specific name, *rapunculus*, being the diminutive of rapa, or radish. In Germany it is called *Rapunzel*, in France *Raiponce*, in Italy *Raperonzola*; the English *Rampion* appears to be the same word. It is much cultivated in France and Italy, and sometimes in Britain, for the sake of the roots, which are 'boiled tender and eaten hot with sauce, or cold with vinegar and pepper.' (Loudon.) In its cultivation the seed should be sown in the spring on deep light soils, in drills; and in the autumn of the year the plants will be ready for use. The *C. persicifolia*, a doubtful native of Britain, and the *C. rapunculoides*, an indigenous plant, may be used for the same purposes as *C. Rapunculus*.

C. lilifolia (*Adenophora lilifolia*, Ledebore) has alternate leaves, the radical ones petiolate, ovate-roundish, cordate, toothed, the corolla campanulate, the style exserted. It is a native of Siberia, and of the east of Europe. Like many others of the genus, it has an edible root, which is sometimes divided into several turnip-formed tubes. The flowers are numerous and sweet-scented. It is interesting from the fact that the leaves, before blossoming, are crowded together on the summit of the stem, so as to form a green rose-like body. But as the axis elongates, the leaves become afterwards scattered on the prolonged stem. The roots are eaten in China both raw and cooked.

The other British species of this genus, not described, are *C. latifolia*, great Bell-flower, common in the North; *C. rapunculoides*, very rare; and *C. patula*, frequent in hedges and thickets. For some of the older species see SPECULARIA, P. C. S., and WAHLENBERGIA, P. C. S.

Most of the species of *Campanula* are worth cultivating, on account of their beautiful blue flower. They thrive well in common garden earth, and may be increased by seeds sown in the open border in spring. The perennial species may also be propagated by division of the root. Those species which are indigenous in warmer climates require a little protection during the winter and spring months. The smaller kinds are adapted for rock-work as well as for collections of alpine plants.

(Loudon, *Encyclopædia of Plants*; Koch, *Flora Germanica*; Babington, *Manual of British Botany*; Burnett, *Outlines*; Don, *Gardener's Dictionary*.)

CAMPBELL, REV. JOHN, was born at Edinburgh in March, 1766, and apprenticed to a goldsmith and jeweller in his native city. About 1789, at which time he was actively engaged in measures for the extension of Sunday-schools and itinerant preaching in the neglected districts near Edinburgh, he began to dedicate himself to the Christian ministry. He subsequently visited London, to take charge of twenty-four young natives of Africa, who were brought from Sierra Leone to be instructed in Christianity, with a view to its introduction into their native land; and during this visit he preached at a dissenting chapel at Kingsland, the pulpit of which he was subsequently requested permanently to occupy. He was ordained in 1804, and retained his pastoral charge until his death, on the 4th of April, 1840, at the age of seventy-four. During his long connexion with religious movements in Scotland and England, Campbell took an active part in the formation of the British and Foreign Bible Society, and several other important religious associations; and in 1812 he undertook a journey to the stations of the London Missionary Society in South Africa, from which he returned in 1814, and of which, in the following year, he published an account in an octavo volume. In 1818 he revisited Africa, on the same errand, and found some interesting changes produced by the civilization introduced by the missionaries. The journal of this second visit, from which Campbell returned in 1821, appeared in 1822, in two octavo volumes. He published several other works, chiefly for the instruction of youth, and he was the founder and for eighteen years the editor of the 'Youth's Magazine,' a religious periodical which has long done good service in the work of popular instruction. In 1823 he established one of the first, if not absolutely the first, of the now long list of attractive magazines for children, being a penny monthly periodical entitled the 'Teacher's Offering.' Among his other works for the young were an abridgment of his 'Travels in South Africa,' published by the Religious Tract Society, 'Walks of Usefulness,' 'Worlds Displayed,' and 'African Light thrown on a Selection of Scripture Texts,' to the second edition of which, published at Edinburgh in 1842, a memoir is prefixed, from which, and from a biographical notice in the 'Evangelical Magazine,' for June, 1840, the preceding statements are chiefly derived.

CAMPBELL, THOMAS, was born July 27, 1777, at Glasgow, where his father, who was the youngest son of a Highland laird, Campbell of Kernan, and had then attained the age of sixty-seven, had spent his life as a merchant, but was now out of business. Thomas was the youngest of a family of ten sons and daughters. At the university of his native city, where he was educated, he appears to have distinguished himself rather by his occasional exercises than by his general industry and proficiency. It is related that a translation (into verse, we suppose) of the 'Clouds' of Aristophanes, for which he obtained a prize in the Greek class, was pronounced by the professor, the late learned and eccentric Professor Young, to be the best exercise ever given in by any student of the university. Others of his performances of this date were, several poetical translations from Sophocles, Tyrtaeus, and other Greek writers, some of which are printed among his works. He had left the university some years, and had been for a short space resident in Edinburgh, when he published there, in April, 1799, his 'Pleasures of Hope,' which brought him at once into notice. Few first poems indeed have ever made so great a sensation; and it has continued to retain its popularity, so that Campbell's poetical reputation with most readers will rest principally upon this juvenile work. It is, to be sure, in subject, form, and extent, the work of greatest pretension that he has left us. Yet, with all its imposing declamatory splendour, and the true poetic glow that animates it, it betrays, both in execution and in substance, the raw and unknit mind of youth, and it will probably not be the production on which its author's more enduring fame will stand. It was a poem of extraordinary promise however for a first production, evincing perhaps as much boldness and originality as any other young writer has shown in our more recent literature. Certainly at least it could not be considered as a mere clever imitation of any reigning model or other previous poetry; taken all in all, in its faults as well as in its beauties, its manner and spirit were its own. It is said that the profits he derived from the sale of the 'Pleasures of Hope' enabled Campbell to visit the Continent, which he did in the latter part of the year 1800. He saw part of Germany, and having proceeded to Bavaria, then the seat of war, had a view from a safe distance of the battle of Hohenlinden, fought in December of that year. He was stopped in attempting to pass into Italy, and returned to England by the way of Hamburg. A seventh edition of his 'Pleasures of Hope' appeared in 1802, 'with other poems,' among which were his noble verses on the battle of Hohenlinden; his spirited and stirring song, 'Ye Mariners of England,' written at Hamburg on the prospect of war with Denmark; his 'Exile of Erin,' also written there; and his 'Lochiel's Warning,' which had been written at Edinburgh since his return. After being nearly two years in Edinburgh, he came to London in 1803; and having in the autumn of that year married his cousin, Miss Matilda Sinclair, he appears to have commenced in earnest the pursuit of literature as a profession. Among the works which he produced in the course of the next five or six years, was a compilation, published anonymously at Edinburgh in 1807, in three volumes, 8vo., entitled 'Annals of Great Britain, from the Accession of George III. to the Peace of Amiens.' He also contributed several articles to the Edinburgh Encyclopædia, begun in 1808, under the superintendence of Dr. (now Sir David) Brewster. Meanwhile, in 1806, he had received from the Fox ministry a pension of 200*l.* a-year, which he enjoyed while he lived.

With the exception of a few occasional short pieces, he published no more poetry till his 'Gertrude of Wyoming' appeared in 1809, accompanied in the first edition by 'Lord Ullin's Daughter' and his 'Battle of the Baltic,' perhaps his finest lyric;* and in a subsequent edition by his beautiful and passionate tale of 'O'Connor's Child.' 'Gertrude of Wyoming' is written upon the whole in a much
than the 'Pleasures of Hope'—though still not wi
sional forms of expression having more sound t
such for example as the 'transport and security
which Byron has ridiculed. With all his truth a
of taste in the matter of diction, Campbell seldom
escapes these hollow conventionalities of phraseolo
in his quieter passages. The best executed porti
'Gertrude of Wyoming,' as of all his poems, an
which he is carried along by passion, and has le
waste on words. For many years after this he
nothing except a few occasional short pieces. I
made a second visit to Germany, and the following
his return appeared his 'Specimens of the British
7 volumes, 8vo. (reprinted in 1841, in one volume,
additional notes by Mr. P. Cunningham). The
English Poetry' by which this work is introduced
in many passages with great beauty and classic
The year after its publication the author delivere
of lectures on English Poetry, at the Surrey I
where Hazlitt had lectured on the same subject
before. In 1820 also Campbell undertook the
of the New Monthly Magazine, which he retained
In 1824 he published his 'Theodric, a domesti
wants the force and fire of some of his other poe
perhaps the sweetest of all his poems. He never
thing more touching than the letter of Constan
the close of this poem. For some years after t
much occupied by the interest he took in the em
of Greece and of Poland, and also in the proj
London University, now University College (
always claimed the credit of originating). But wha
Campbell had in originating the idea of a un
London, the execution of the work is due to oth
VERSITY COLLEGE, P. C.] In 1827 he was elect
of the University of Glasgow, and he was re-elec
office in the two following years. He lost his wife
he had one son, who survives him, in 1830; in 18
blished the Metropolitan Magazine upon relinq
losing the editorship of the New Monthly, but r
management in his own hands only for a short tim
1832 he paid a visit to Algiers, an account of whi
lished in the Metropolitan Magazine in a series
afterwards, in 1837, collected and reprinted in tw
8vo. under the title of 'Letters from the South.'
publications of his last years, none of which b
much reputation, were a 'Life of Mrs. Siddons,'
1834; a 'Life of Petrarch,' 2 vols. 8vo. 1841;
Times of Frederick the Great' (of this he profe
only the editor), 4 vols. 8vo. 1841, and 1843
'Pilgrim of Glencoe,' a poem, 8vo. 1842. In t
of 1843 he retired to Boulogne; and he died th
15th of June, 1844. His body was brought over
and interred on the 3rd of July in Westminst
near the centre of Poet's Corner, close to th
Addison.

(*Gentleman's Magazine* for August, 1844;
Cyclopædia of English Literature, vol. ii. pp. 369,
Campbell's various Works.)

CAMPI, the name of a celebrated family of
Cremona. The eldest and master of the others
Campi; the others were Antonio, Vincenzio, and
Campi: the first three were the sons of Galeazzo C
died in 1536, the last apparently their cousin. A
Vincenzio were both living in 1591, in which yea
died: Antonio was painter and architect.

Giulio, according to Lanzi, was the Ludovico,
nardino the Annibale, comparing them with the
a school. Giulio was born about 1500, and die
He was the scholar of Giulio Romano at Mantua
tributed greatly to the dissemination of the princi
Roman school throughout Lombardy, where his wo
as those of all the Campi, are very numerous. In
stances he has combined the vigour of design of
mano with the colour of Titian, but his works are
styles.

Bernardino Campi was born in 1522, and died a
Though instructed by Giulio, he adopted a diff
from his cousin, and is generally allowed to have
him. They were both very similar in colour, but
Bernardino was more chaste than Giulio and less r
was also an excellent portrait painter. He was
a goldsmith, and was induced to adopt painting f

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* On the attack on Copenhagen by Nelson in 1801. We have not been able to discover whether this poem appeared now for the first time. The writer (Jeffrey) of the article on 'Gertrude of Wyoming' in the Edinburgh Review (for April 1809), says 'The Battle of the Baltic, though we think it has been [illegible] before, is much less known' (than Lochiel and Hohenlinden).

ipestries worked from designs by Raphael, whose sim- r of style he always adhered to. Some of the greatest in Cremona and Mantua were painted by Bernardino: asterpieces are the frescoes of the cupola and other in San Sigismondo at Cremona, which for paintings is f the richest churches in Italy. Bernardino painted the a in seven months. A Nativity in the church of San nico is also considered a masterpiece of art, and would nour to the greatest painters.

ist, *Notizie Istoriche de' Pittori, &c. Cremonesi*; Lanzi, *a Pittorica*, &c.)

AMPO BASSO. [SANNIO, P. C.]

ANADA. By the treaty signed at Washington, st 9, 1842, the boundary between Canada and the d States has been permanently defined on the east, and e west as far as the Rocky Mountains. The eastern dary commences at a point called the Monument, at the e of the river St. Croix, thence north following a line ed in 1816 and 1817 to its intersection with the river John and to the middle of the channel of the river; e to the mouth of the river St. Francis, along its channel he lakes through which it flows, to the outlet of Lake agamook, thence south-westerly in a straight line to a on the north-west branch of the river St. John—which is to be 10 miles distant from the main branch of the ohn, but if the said point is found to be less than 7 miles the nearest crest of the highlands which divide the flowing into the St. Lawrence and the St. John, then id point is to recede down the said north-west branch e St. John to a point 7 miles from the crest—thence, in ight line, to where the parallel of 46° 25′ N. lat. inter- the south-west branch of the St. John; thence southerly source at Metjarmette Portage and along the highlands h divide the rivers falling into the St. Lawrence from falling into the Atlantic to Hall's stream, and down middle of it, until the line intersects the old line of dary surveyed previously to the year 1774 at the 45th e of N. lat., and thence west along this line to the St. rence.

e western boundary is altered at the entrance to Lake rior so as to transfer to the United States the island of George, or Sugar Island. The line is then carried gh Lake Superior north of Ile Royale, then south-west geon river, along it and Lakes Saisaginega, Cypress, Blanc, La Croix, Little Vermillion, Namecan, and La to Chaudière Falls, thence to the north-western point e Lake of the Woods (49° 22′ 55″ N. lat. and 95° 14′ 38″ long.), thence due south to its intersection with the parallel of lat. and along that parallel to the Rocky ntains.

ese lines were defined to settle differences which had en the construction of the treaty made between Great in and the United States in the year 1783. Previous to eaty the extent of Canada to the west was much more iderable than at present—extending as far south as the e of the Mississippi (47° 10′ N. lat.), and from the source is river west to the Rocky Mountains. According to the ch official map, made in 1757, and used in the nego- ns of 1762, it included all the country not then defined rt of the province of Louisiana.

nce the article in the P. C. was written some magnificent ls connected with the navigation of the St. Lawrence been undertaken. The first of these is the enlarge- t of the Welland Canal, uniting Lakes Erie and Ontario he north of the Niagara river. The new locks are 26½ wide, 8½ feet in depth, and 145 feet long. The canal f is 45 feet wide at the bottom, and 10 feet deep. The ated cost of the improvements is 405,900*l.*, and they are ected to be completed in the present year (1845). The s uniting Lake Ontario with the great ports of the pro- e are the Cornwall, the Beauharnois, and Lachine. e canals give 10 feet depth of water, with a width of et at the bottom, and the locks are 45 feet wide, 200 long, and give 9 feet depth of water. The Cornwall is 11½ miles long with a fall of 48 feet, and avoids the violent rapids of the St. Lawrence. The Beauharnois is not yet complete. It is situated on the south side of ver; the length is about 12 miles, and the estimate of t is 248,976*l.* It unites the Lakes St. Francis and St. , the navigation between which is checked by the es, and will, in connection with the Cornwall canal, boats to avoid the necessity which now exists of going the Rideau canal—a work which will lose much of its usefulness for commercial purposes. The enlargement of the Lachine canal, at an estimated cost of 208,636*l.*, is expected to be completed in 1846. It ought originally to have been carried from Lachine, on the north side of Lake St. Louis, to the most eastern part of the city of Montreal, and to have entered the St. Lawrence below the island of St. Helene. It would thus have afforded winter docks for vessels at Montreal, and have saved the trade the expenses of steamers to bring vessels up the rapids at the north-east end of St. Helene's island.

The Chambly canal, which unites the lake of Champlain with the Richelieu river, and by this river with the St. Lawrence, is completed.

The tenure of land in the Seignoral districts of Lower Canada, that is, with two exceptions, of lands granted by the crown of France, is remarkable, and as a system of colonization deserves notice. A tract of land, varying in extent —but sometimes large, as in the case of the seignory of Beauharnois, which is six square leagues—was granted to a seignor, or lord of a manor, to re-grant to others at a certain fixed rent (*cens*). The seignor held of the crown upon the accustomed rents and dues, according to the custom of Paris: he had a local legal jurisdiction, which is now abolished; he performed homage on a mutation of possession; he was to reside by the express condition of some grants (*tenir feu et lieu*); certain timber was to be reserved for public purposes; he was to make roads; and he had the privilege of trading with the Indians. On alienation by the seignor, the fifth part of the purchase-money (*quint*) was paid to the crown. He was bound to make grants of the waste lands to applicants at the accustomed rent, and he was forbidden to sell such land to them. He had the right to enforce mill-service (*droit de banalité*), or the grinding of corn at his mill; and the right of pre-emption (*droit de retrait*) of lands offered for sale by persons within the seignory.

Any settler, not already possessed of land, was entitled to demand of right, from the seignor, a grant of waste land, usually of about 90 acres, at the accustomed rent, commonly a *sol* or penny an acre—a rent of the nature of our chief rent in free and common socage manors; the grantee was personally to occupy his land under the penalty of its re-union to the domain; he was to clear the land: to make and repair roads; to preserve certain timber for the crown; to give notice of minerals; and on alienation one-twelfth of the purchase-money (*lods et ventes*) was to be paid to the seignor.

The system had many advantages. The settler had no more land than his means enabled him to cultivate; what he received he was to cultivate; he was to reside; he was not required to apply any part of his previously accumulated gains in the purchase of his land, and the whole of his capital was free to be employed in agriculture. As his family increased, his children were enabled to apply for new grants, and to extend the settlement of the country.

Upon the establishment of the English authority in Canada, the enforcement of the law against the tenants continued, but was neglected by the crown against the seignors. The mill-service has been abused by conditions of grants that no mill of any kind shall be erected by the tenant—a condition beyond the authority of the seignor to impose, and as a general condition perhaps void, as being opposed to public policy. The right of pre-emption, which was formerly perhaps beneficial in checking excessive land speculation, has been used to gratify personal animosity. The accustomed rent has been increased, as though it was a farm rent, and this has also been done to evade the penalty of forfeiture imposed on the seignor in case he sold the land for a fixed sum—a proceeding which induced the commissioners who lately reported on the subject, to observe that 'they could recognise no difference between demanding for a concession a sum of money in the nature of a price, and the stipulation of that price in the shape of a rent-charge'—'in both instances there would be a violation by the seignor of the original conditions of his grant.'

The abuses of the system have occasioned many complaints in the province, connected also with a strong feeling in favour of the commutation of the fines payable on alienation. But instead of submitting the subject to the Provincial Legislature, which was perfectly competent to deal with it, the government passed the imperial act of the 6 Geo. IV. c. 59, called 'the Canada Tenures Act,' which has placed matters in a worse state than before. Instead of enforcing on the seignors the duty to make grants, which many refused to do;

placing the rent in a uniform state, and checking the abuses of the seignors; this act enables the seignors to pay the fifth (*quint*) to the crown, and on so doing the tenure of the land is commuted into free and common socage; the waste lands, which they only held on trust for public purposes, become private property; and the tenants, whose grievances were alleged to justify this measure, are left more completely at the mercy of the seignors than before, and no conditions are imposed on the seignors to afford to them any relief. 'It has been asserted,' say the Commissioners, 'by persons from various sections of the district of Montreal, that the feudal exactions and the neglect of the government to enforce the antient laws of the Province in relation to the tenure, conduced in no small degree to the outbreaks in 1837 and 1838.' Had the system been amended and enforced, it would have been found to have been infinitely preferable to making large grants to land-companies—for even under its imperfect working, the French settlements of Lower Canada present a remarkable spectacle of successful colonization, though checked by circumstances which have seriously interfered with the activity and energy of the population.

There are 223 seignories in Lower Canada. They are almost inclosed by the townships, or lands held in free and common socage. It would probably have been most prudent to have granted all lands in Lower Canada on the tenure of *franc alieu*, not unlike our socage tenure. All persons would then have had a common interest in the amendment of the law, and the marked distinction between French and English tenures, which has a most mischievous political effect, would have been avoided; while the extension of the French population to the American frontier, whose attachment to the English government is greater than to any republican institutions, would have created a community of interest between them and all other settlers in Lower Canada favourable to the English government.

In Upper Canada the land is held upon the tenure of free and common socage. The system of land-holding is defective in not being connected with a general land-tax on all waste lands not in the possession of the crown. The surveyors' note books and surveys ought also to be as generally accessible as similar documents are in the United States, to every person desirous to obtain information of any land proposed to be sold by the government. (*Report of the Commissioners on the Seignoral Tenure of Lower Canada.* 1844.)

The sketch of the political history of Canada was brought down in the P. C. to the year 1836, when Sir F. Head, who had been appointed lieutenant-governor of Upper Canada in December, 1835, was in the province; and Lord Gosford was governor of British North America. At that time there were associated with the latter, as commissioners, to inquire into the affairs of the province, Sir C. Grey, a retired Indian judge, and Sir G. Gipps, an officer of engineers. The events since this period have produced a great change in the government of the province. The amicable feelings which at first prevailed between the assembly of Lower Canada and Lord Gosford were interrupted by the unexpected disclosure made, during the sitting of parliament, by Sir F. Head, of the instructions given by the British government to Lord Gosford, which were considered to indicate a want of good faith in the mission with which he was charged. The supplies were consequently refused. But in the same session the House of Assembly sat 109 days—117 bills were introduced; 58 were passed; 34 were passed by the Assembly and rejected by the Legislative Council; 15 were passed and returned with amendments by the council; 10 were introduced into the assembly and not passed; 5 were received from the council and not passed, and one was reserved for the sanction of the home government;—62 reports were made by standing committees, and 104 reports were made by special committees. Of these measures not one has been specified as injurious to British interests. The refusal of supplies, the demand for a reform of the Legislative Council, the opposition to a wasteful grant of public lands, and the endeavour to secure the responsibility of the members of the administration to the house, were the acts for which the assembly has been condemned. The house was composed of 88 members, of whom the government had only the support of about 8; and this was the original fault of the system. A representative government existed, and the country was governed as a Crown colony, the members of the administration having rarely been taken from the house and never from the party composing the majority.

It is important to remark, that on August 20, 1836, the
Hon. Mr. Baldwin, in a letter to Lord Stanley, pr
establishment in Canada, of a provincial cabinet,
of persons possessed of public confidence, and whos
and policy should be in harmony with that of the rep
body.' He stated that in Upper Canada, from 182
the provincial administration had been in a minority
years and in three parliaments. The radical ev
administration of the two provinces was the same.

On the publication in England of the report of
missioners sent to Lower Canada, Lord J. Russell i
in parliament ten resolutions. The 1st stated that
amounting to 142,160*l.* had been refused in Lowe
between the years 1832 and 1837; 2nd, that in
1836, the governor had applied to the assembly for t
and for funds necessary to carry on the civil gove
the province; 3rd, that the House of Assembly, on t
October, 1836, had refused the supplies and re
elective legislative council; the repeal of the North
Land Company Act; and the free exercise of i
over all branches of the executive government; 4t
the 'existing state' of Lower Canada, it was unad
make the council elective, but that measures should b
to secure to it a greater degree of public confide
that while it was expedient to improve the composit
executive council in Lower Canada, it was unad
subject it to the responsibility demanded by the
Assembly; 6th, that the title of land holden by
American Land Company ought to be maintained
7th, that it was expedient, when lands in Lower Ca
be discharged from feudal dues and services, to repea
nada Tenures Act;' 8th, that for discharging a
receiver-general of the province should be empowe
the amount from the revenues in his hands; 9th,
hereditary, territorial, and casual revenues of the
should be placed at the disposal of the legislatu
civil list shall have been granted; 10th, that the legi
Lower and Upper Canada should be respectively
to make provision for the joint regulation and adj
questions relating to trade and commerce.

These resolutions were carried by a large ma
virtually deprived the Assembly of the only cont
existed in the province over the acts of the admi
Great discontent was produced when they were ann
Canada; public meetings were held, violent resolu
passed, but not a single step was taken by the gov
secure peace or to prevent the occurrence of viole
legislature of Lower Canada was again convoked o
of August, 1837, when the resolutions passed in
parliament were communicated; but the assembly a
its demands, the propriety of which it considered the
themselves to have confirmed, and a prorogation t
Matters were brought to an issue by the arrest of t
leaders, who were rescued. Warrants were issue
arrest of others; the peasantry in the districts of
and of Grand Brulé rose in arms, and were defea
military. The issue was not doubtful, but the ho
civil war were witnessed. At St. Eustache, Sir J.
had no influence over the militia who accompanied
houses were burnt and people pillaged after they
mitted, and in opposition to his orders. About the
an insurrection occurred in Upper Canada, where co
exasperation prevailed against the government. I
suppressed. The military force in both sections o
vince being small, and the absence of previous p
having weakened the authority of the administratio
law was proclaimed.

Lord Gosford was recalled from Lower Canada,
Colborne became Administrator. Sir F. Head wa
from Upper Canada, and was succeeded by Sir G
On January 16, 1838, the Earl of Durham was
governor of Canada and high commissioner for the
of Canadian affairs. On the 10th of February the
1 Vict. c. 9, was passed, suspending the legislature
Canada, and empowering the appointment of a spec
Lord Durham arrived in Canada May 27, and on
1838, passed an ordinance, by which it was enac
twenty-six persons, among whom was the ex-spea
assembly, Mr. Papineau, should any of them ever
into the province, they should suffer death 'if co
being found at large or coming into the provinc
persons were also transported to Bermuda, a place
jurisdiction of the government of Canada. This
was disallowed by the Crown, and, in consequence

l Durham at this step, and the Act to indemnify
up his office and returned to England without
ort was however made by him ou the affairs of
ich it was advised that the two provinces should
l that the responsibility of members of the exe-
House of Assembly should be recognised by
administration with the majority of the house.
rbance in Canada shortly afterwards occurred,
tution of Lower Canada was further suspended
of parliament. On the 23rd of July, 1840, the
4 Vict. c. 35, for the re-union of the provinces,
It authorises the appointment of a legislative
Crown of not fewer than twenty members; and
ie two provinces shall return an equal number
ves to the House of Assembly (at present 42
ne city of Toronto shall return two members,
of Kingston, Brockville, Hamilton, Cornwall,
lon, and Bytown, in North Canada, one each;
of Quebec and Montreal shall return each two
the towns of Three Rivers and Sherbrook, one
members of the House of Assembly shall be
r years; that all writs, proclamations, journals,
uncil and assembly shall be in the English lan-
aat the entire duties and revenues of the pro-
rm one consolidated fund, and the sum of
ecifically appropriated for the civil government
e. The act was brought into operation during
tion of Mr. Poulett Thomson, who was created
m. Many of his measures have been severely
ut his true merit was, that he acted with the
e assembly, though that majority for the time
y some unpardonable proceedings at the elec-
t, for the first time, the House of Assembly
connected with the actual government of the
ith its administration. The House of Assembly
th his assent, the responsible government reso-
permanent establishment of this system. When
nies desired to interfere in the direction of the
Lord Sydenham replied, that 'the local govern-
legislature were more intimately acquainted
ested in the works in question than any set of
London,' and he acted as if convinced that the
be governed through the aid of the representa-
local opinion.

th of Lord Sydenham, Sir C. Bagot was ap-
ceed him. He associated to his administration
eading French Canadians, who had been un-
l from office. This step had the happiest re-
y seemed banished from the province. He is
ven his ministry too much power, but no act has
sustain the statement, and he governed in a
honour, justice, and legality. Sir C. Bagot was
atal illness, and was superseded by Sir C. Met-
ent governor, in 1843. The ministers then in
ice resigned, and the first parliament of the
ce was dissolved in consequence. They claimed
l on all public appointments, as responsible to
for the conduct of public business. It does not
y appointment which they proposed to make was

An assertion of an uncontrolled prerogative on
f patronage has been made by the governor,
ally the same with that which was contested in
uring Lord Bute's administration. The new
h is chiefly composed of members of the old
appears to have very nearly equal members, in
ament, with the parliamentary or responsible
rty; but their real position is at present undeter-
quence of many petitions on contested elections
e heard.

able that the Colonial Office should have hesi-
ith cordiality and openness with the respon-
of the local administration. They are jointly
he government of the province, and the dis-
ablic patronage by the local administration is
y sign of confidence and an element of political
weak executive can possess little power for any
oses.

liament restored the ancient boundaries of the
ec and Montreal, which had been limited by
m, and it petitioned the Crown against the
Union Act. The new parliament has already
Crown against the clause of the Union Act re-
e of the French language.

The total expenses paid by this country on account of the army, navy, ordnance, and commissariat in Canada in 1837. was 189,048*l*. The total excess of expenditure, above this amount, from the year 1837 to 1843, in consequence of the insurrection, has been 4,909,017*l*. The expenditure for these services in 1843 was 806,007*l*.

The population of the counties of Lower Canada in 1831 and 1843 was as follows:—

Counties.	1831.	1843.
Saguenay	8,385	13,445
Montmorency	8,089	8,434
Quebec	36,173	45,676
Portneuf	13,656	15,922
Champlain	6,991	10,404
St. Maurice	16,906	20,591
Bertier	20,225	26,705
Leinster	22,122	25,307
Terrebone	16,623	20,646
Two Mountains	20,905	26,835
Ottawa	4,786	11,340
Montreal	43,773	64,306
Vaudreuil	13,111	16,616
Beauharnois	16,859	28,580
Huntingdon	29,916	36,204
Rouville	18,185	21,198
Chambly	15,483	17,171
Vercheres	12,319	12,968
Richelieu	16,146	20,983
St. Hyacinthe	13,365	21,734
Shefford	5,087	9,996
Missisquoi	8,801	10,865
Stanstead	10,306	11,846
Sherbrooke	7,103	13,302
Drummond	3,566	9,374
Jamaska	9,496	11,645
Nicolet	12,509	16,280
Lotbiniere	9,191	13,617
Megantic	2,283	6,730
Dorchester	23,816	34,826
Bellechase	13,529	14,549
L'Islet	13,508	16,990
Ramonraska	14,557	17,465
Rimouski	10,061	17,577
Gaspé	5,003	7,458
Bonaventure	8,109	8,230

Total, 1831, 511,912; 1843, 678,590, or increase 166,671.

The county of Leinster includes those of L'Assomption and Lachenaie; that of Huntingdon, those of L'Acadie and Laprairie; that of Dorchester, those of Dorchester and Beauce; and that of Montmorency, those of Montmorency and Orleans, which counties were distinct in 1831.

The population of the city of Montreal in 1843 was 40,137.

The population of Upper Canada in 1841 was as follows:—

Ottawa	9,324	Toronto (city)	14,249
Eastern	30,279	Niagara	34,521
Johnstown	35,952	Gore	42,577
Bathurst	27,635	Wellington	13,851
Prince Edward	14,661	Brock	15,621
Midland	32,208	Talbot	9,626
Victoria	13,161	London	32,257
Newcastle	41,952	Western	23,026
Home	64,401		

Total in 1841, 455,301; in 1831, 321,903; increase, 133,398.

Total population of the whole province 1,133,891. The population of the town of Kingston in 1841 was 6292; Hamilton, 3413; and of Cornwall, 1407.

The total number of emigrants who arrived in the province, at Quebec, from 1832 to 1841 both inclusive, was 227,608, most of whom must have gone elsewhere.

The number of emigrants who arrived at Quebec in the following years was:—

Where from.	1836.	1837.	1838.	1839.	1840.
England and Wales	12,188	5,580	990	1589	4,567
Ireland	12,590	14,538	1456	5113	16,291
Scotland	2,224	1,509	547	485	1,144
Nova Scotia, &c.	720	274	273	255	232
	27,722	21,901	3266	7439	22,234

In 1841, 28,086; in 1842, 44,374; in 1843, 21,727; and in 1844, 20,142. Total in 9 years, 196,891. The number of emigrants from the United Kingdom who arrived at ports of the United States in part of the above period was:—

1836	59,075	1840	41,500
1837	34,000	1841	45,017
1838	13,059	1842	63,852
1839	24,376	1843	28,335

Total, 309,214.

The arrival of shipping at Quebec in the following years was:—

	Ships.	Tons.
1842	863	307,448
1843	1185	429,741
1844	1214	458,971

The public provision for education in Upper Canada is very limited, and in no part of North America is education so little regarded. That part of the public lands which ought to have been appropriated to educational purposes has been otherwise applied. In Lower Canada Lord Goderich, by a dispatch of July 7, 1831, consented to yield to the claim of the assembly, and to place the revenues of the estates of the Jesuits at the disposal of the provincial legislature, for the support of education in Lower Canada. The chief part of these estates consists of five seignories at Quebec, one at Montreal, and two at Three Rivers. Their revenue in 1841 was 4566*l.*, and a sum of 29,592*l.* on the same account was, in 1844, in the provincial chest, without interest. The funds have been, at various times, grossly misapplied, though probably there is nothing which the Lower Canadians more anxiously hope for than their application to the noble purposes to which they were originally devoted, in a manner that shall give distinction and honour to Lower Canada. The old college of the Jesuits, part of the estates at Quebec, is at present occupied as barracks.

In 1842, in Lower Canada, 44,703 acres of land were sold, at an average of 3*s.* 2*d.* per acre for crown lands, and 4*s.* 6*d.* per acre for clergy reserves, both being waste lands, and the revenue of the one forming part of the public income, and that of the other being specially appropriated. In Upper Canada 23,621 acres were sold, at an average of 9*s.* an acre for crown lands, and 11*s.* 3*d.* for clergy reserves. In Upper Canada the practice of extensive leasing has been introduced in order to favour colonization, but the experience of a similar attempt in the early settlement of the old colonies of America, and the great amount of arrears in all cases of leasing crown lands in Canada, prove its inexpediency, and the political evils it may occasion. The rents of leased clergy reserves in 1842 in Upper Canada were 4996*l.*; but of this sum only 1108*l.* had been collected. 'Experience,' Sir C. Bagot stated, 'had proved the inefficiency of past efforts to collect them, and that irritation and ill-will were sure to follow the adoption of extreme legal measures by the government.'

In 1841 there passed the Welland and Lachine canals these quantities of goods:

	Welland.	Lachine.
Of the Forest	66,923	46,614
Agriculture	77,659	89,989
Merchandise and manufactures .	4,540	20,351
Miscellaneous . . .	23,841	13,640
Tons .	172,964	172,564

The miscellaneous articles consisted of salt, plaster, coals, bricks, stone, &c.; but a very considerable quantity of timber passes to Montreal and Quebec without entering the Lachine canal.

The tolls received on the Welland canal were, in 1835, 5807*l.*; 1841, 22,210*l.*; 1843, 24,906*l.* The tolls on the Lachine canal were, 1827, 3051*l.*; 1833, 7154*l.*; 1842, 14,131*l.*; 1843, 16,159*l.* On the Chambly canal in 1843, 7322*l.* On the Burlington Bay canal in 1842, 1918*l.*

The gross amount of customs' duties received in 1843-44 was 241,572*l.*, and the amounts received at the following places will show the chief places of trade; Quebec, 55,843*l.*; Montreal, 102,482*l.*; Toronto, 17,603*l.*; Kingston, 9278*l.*; Hamilton, 12,191*l.*; St. John's, 22,350*l.*

Previous to the Union, the province of Lower Canada had only a small debt of about 30,000*l.* In Upper Canada, in 1839, Sir G. Arthur stated the debt to be 1,162,187*l.*—the interest 65,000*l*; the permanent expenses of the government, 55,000*l.*; and the revenue 78,000*l.*, leaving a deficiency of 42,000*l.* In January, 1844, the debt incurred previous to the Union amounted to 1,559,431*l.*, and the new debt to 781,125*l.*; total 2,340,556*l.* The net revenue of the province at the same date was 320,987*l.*, which, with a previous of 79,347*l.*, gave the total receipts for the year at *l.*, and a balance over expenditure of 115,505*l.*

By a late alteration of duties, foreign wheat i Canada is taxed under a provincial act at 3*s.* per wheat and flour exported from Canada may be in Great Britain at a duty of 1*s.* per quarter.

(*Parliamentary Papers from* 1836 *to* 1845.)

CANARIA, or Gran Canaria, is an island of group, to which it has given its name. It is situa 27° 45′ and 28° 15′ N. lat., and between 15° 25′ W. long. It is nearly circular, and about twent in diameter, or seventy-five in circumference. like the other Canaries, is of volcanic origin, c trachyte, basalt, and more recent volcanic produc surface is extremely uneven, and the rocks rise with a steep acclivity. The most elevated point southern coast, and is called Pico del Pozo de The German naturalist Von Buch determined i above the sea by the barometer, and found it to be lish feet; but Lieutenant Arlett found it to be Nearly in the centre of the island is the Roque according to Von Buch 5656 feet, and according nant Arlett 6070 feet, above the sea-level. The tween these volcanic masses are not of great widt fertile, which is always the case where the soil i decomposition of volcanic matter. In climate the sembles the island of Teneriffe. Canaria has n ages than any other of the Canaries. The bank rests generally extends to a greater distance fro During the summer, when there is a constant nort the high land, by obstructing its course, occasio prevail off the south-west end of the island to the eight or nine miles from the land, where the divi again unite. The same cause however gives ris erly current close in shore, which the coasting ve account. The productions of this island do no those of Teneriffe [P. C., vol. xxiv. p. 204], there are no camels on Canaria. The capital, La built on a bay of moderate extent, which has t chorage. It is the largest town in the Canarie population of 18,000 individuals. It is well buil cathedral, hospital, and college, with convents of nuns. It is well supplied with water, having fou the streets or principal squares. The market is w with every kind of provisions, especially of fruit. I considerable commerce with England and Americ a few small vessels to the fishery on the western s Sahara. Canaria was taken by the Spaniards i has since remained in their possession.

(Glas, *History and Conquest of the Canary Is* Buch, *Physikaliske Beschreibung der Canarischen Canarischen Inseln nach ihrem gegenwärtigen Z* Mac Gregor; and Arlett's *Survey of the Canary London Geogr. Journal*, vol. vi.)

CANCELLIE'RI, FRANCESCO, born a 1751, after studying in the Roman college unde professors Cunich, Cordara, and Zaccaria, becam to the senator Rezzonico, and afterwards libr learned Cardinal Antonelli, Prefect of the Prop 1773 he edited a newly discovered fragment of th of Livy, with a preface. On the occasion of the added by Pius VI. to the Basilica of the Vatican, undertook a work of historical and liturgical erud antient office of Secretary of that Basilica, 'De Basilicæ Vaticanæ,' 4 vols. 4to., Rome, 1788, whi an ample store of information concerning the I early history, its vaults, its library, its former mo circuses of Caligula and Nero, with illustrations o monuments and documents. This work was rec great applause by the learned, and the author among the first writers on church antiquities. He published a 'Descrizione del Carcere Tulliano,' a n statues of Pasquino and Marforio, as well as vario on the ceremonies which are performed in St. Pet and in the pontifical chapel of the Vatican on gr days; he explained the origin and meaning of ceremonies, most of which appear to the uninform as unmeaning pageants and mummeries; but are re 'Descrizione dei tre Pontificali che si celebrano ne Vaticana per le Feste di Natale, di Pasqua, e di 'Descrizione delle Funzioni che si celebrano nell Pontificia per la Settimana santa;' 'Notizie intorno Vigilia, Notte, e Festa di Natale;' 'Descrizione del Pontificie e Cardinalizie di tutto l'Anno;' 'Storia Possessi de' sommi Pontefici da Leone III. à Pio V ie storiche delle sacre Feste dei SS. Apostoli Pietro e Paolo, lella loro solenne Ricognizione nella Basilica Lateranense a da Pio VII.;' 'Descrizione della doppia Illuminazione h Cupola di S. Pietro a Lanternoni e Fiaccole, e della andola della Mole Adriana.' Most of these treatises have n translated into French.

Vhen the French revolutionists drove away Pius VI. from ne, in February, 1798, Cancellieri was separated from his on Cardinal Antonelli, who was arrested and sent to itavecchia. Some years after, when Pius VII. took posion of Rome, Cancellieri was appointed director of the ting-press of the Propaganda. In 1804 he accompanied linal Antonelli to Paris, on the occasion of Napoleon's nation. He kept a diary of that journey, from which y entertaining extracts are found in Baraldi's Life of Canieri. When the French invaded Rome a second time, in 8, Cardinal Antonelli was banished to Sinigaglia, where lied in 1811. At the restoration of Pius VII. Cancel- was reinstated in his office. He continued to write works ntiquarian erudition until 1826, when he died at Rome. year before, he had at his own expense raised a hande cenotaph with a biographical inscription to his patron linal Antonelli, in the Basilica of the Lateran, below h he desired by will to have himself buried. He ished an account of this monument: 'Cenotaphium Leoi Antonelli,' Pesaro, 1825. Pietro Visconti wrote the y of Cancellieri for the Tiberine Academy. The Mar- Villarosa wrote on the same subject, 'Ultimi Uffizii alla noria dell' Abate Francesco Cancellieri,' Naples, 1827. ng the printed works of Cancellieri, which exceed 160 mber, the following, besides those already mentioned, deserving of notice: 1, 'Il Mercato, il Lago dell' Acqua gine, il Palazzo Panfiliano nel Circo Agonale,' &c., 4to., ne, 1811. This is an erudite description of a most inting district of the city of Rome. 2, 'Dissertazione ino agli Uomini dotati di gran Memoria, e a quelli divenuti morati,' 1815; 3, 'Descrizione dell' Uso di rappresentare fana nell' Epifania.' This refers to one of the popular nes of Rome. 4, 'Notizie sopra l' Origine e l' Uso dell' llo pescatorio e degli altri Anelli ecclesiastici,' 1823; emorie della Vita ed Opere del Pittore Errante,' 1824; Notizie delle Stagioni e de' Siti diversi in cui sono stati i Conclavi nella Città di Roma,' 1823; 7, 'Lettera l' Origine delle Parole Dominus e Domnus, e del Titolo Don,' Rome, 1808; 8, 'Dissertazioni epistolari sopra toforo Colombo e Giovanni Gerson,' 1809; 9, 'Elogio Cardinale Stefano Borgia,' 1809; 10, 'Elenchus Librorum omnigenis Formis impressi prodierunt e Propaganda,' 7. Many of his minor works have appeared in the neridi Letterarie,' 'Notizie del Giorno,' 'Giornale dico,' and other journals. There is a list of his inedited s, amounting to eighty.

(Tipaldo. *Biografia degli Italiani Illustri.*)

ANDLES AND LAMPS. [LIGHTS, ARTIFICIAL, C. S.]

ANDOLLE, DE. [DE CANDOLLE, P. C. S.]

ANKER-BRAND. [UREDO, P. C.]

ANNA, a genus of plants belonging to the natural order taceæ. It has spathaceous flowers, simple anthers atd to the edge of a petal-like filament, an inferior ovary, a club-shaped erect free style, a linear obtuse stigma. are several species of this genus, all of which are known e name of Indian Shot. They are inhabitants of South ica and of the East Indies.

C. *Indica* has the inner limb of the corolla trifid, the segs lanceolate, acuminate, straight. This species, with C. and C. *coccinea*, are common plants within the tropics ll the continents. In America and Brazil they are by the common name of wild plantains. Their leaves ge and tough, and are mostly chosen for forming envelor articles of commerce. Hence the French call these *Balisiers*. The seeds of most of the species are round, shining, hard, heavy, and about the sixteenth of an diameter, resembling shot, for which they are someused as a substitute.

dulis has smooth leaves and stems coloured at the base, ts tuberous and large, the middle segment of the corolla y short. This is one of the species of the order the rootk of which is used for making arrowroot. Nearly all the cies contain starch in the rootstock, which renders them fit be used as food after being cooked. The starch is separated aring the rootstock in pieces, and submitting it to the n of water. The water with the starch suspended is poured off from the ligneous portion of the rootstock, and the starch is afterwards allowed to subside. Clusius says that the *C. lutea* grows in the open air in Spain and Portugal, and that the inhabitants of those countries use the seeds for making rosaries.

Many of the species will bear the open air in the summer in this country. They require a light rich soil, and may be increased by dividing the roots or by sowing the seed. They should be planted out in a warm border early in the summer.

(Loudon, *Encyclopædia of Plants.*)

CA'NO, ALONSO, a very celebrated Spanish painter, sculptor, and architect, was born at Granada, in 1601. He was educated in Seville, whither his father, an architect, had removed; and he studied sculpture there, under J. Montanes, and painting under Pacheco and Juan de Castillo, all men of celebrity; but Cano's true masters in design were some antient statues in the Casa de Pilatos, belonging to the Duke of Alcalà. Cano is called the Michelangelo of Spain; in some respects they were similar, but the similarity is more in the extent of their abilities than in the quality. Cano, as did also Michelangelo, obtained his reputation first by sculpture, and as early as 1639, he had earned such celebrity, that he was appointed painter to King Philip IV. of Spain, and had the superintendence of various architectural works in the royal palaces of Madrid and in the city. After various adventures in the principal cities of the south of Spain, Cano died at Granada, in 1667, leaving a numerous school, but he had not a single scholar who approached him in ability. His works, which are conspicuous for vigour of design, richness of colour, and boldness of execution, are very numerous; there are many at Seville, Xeres, Cordova, Madrid, the Escurial, Toledo, Alcalà de Henares, Cuenca, Avila, Valencia, Murcia, Malaga, and Granada, where, in the church of San Diego, a Conception of the Virgin with angels is considered his masterpiece.

Cano was of a singular disposition and of a violent temper, which on more than one occasion placed him in great danger of the Inquisition. He was accused of having assassinated his wife out of jealousy; but the charge rests solely upon the testimony of Palomino, who wrote many years after the event which gave rise to the rumour. Cean Bermudez sought in vain for a record of any process against him. The story is, that at Madrid, in 1643, when he returned home one evening, he found his wife assassinated, his house robbed, and an Italian assistant who used to live with him had absconded; but notwithstanding the presumptive evidence against the Italian, Cano was himself accused of the murder, and was put to the rack; no confession however being elicited from him, he was released and absolved of the charge. Upon his plea of *excellens in arte*, his right arm had been exempted from the torture. Several years after, in 1658, when he was in Granada, a councillor of that city commissioned him to make a small figure of Saint Antony of Padua; for which, when finished, Cano asked 100 pistoles. The councillor, reckoning up the time that Cano had been about the work, said, 'Why, you have been 25 days only, over this figure, and you are charging me four pistoles per day for your work, an exorbitant rate; for I, who am a councillor, do not receive half so much.' Upon which Cano, greatly incensed at his misplaced arithmetic, furiously answered, 'I have been 50 years learning to make this figure in 25 days;' and immediately dashed the saint to pieces on the pavement, to the great consternation and horror of the simple councillor, who made all haste out of the house of a man who could so unceremoniously demolish a saint. The act was in fact a capital offence; but it appears to have been unknown to the Inquisition. A similar destruction of an image of the Virgin caused the death of Torrigiano, who was convicted of heresy, and died in prison, before his sentence was carried into effect. Cano is said also on his death-bed to have refused to take the crucifix presented to him by the priest, on account of its bad workmanship.

(Palomino, *Museo Pictorico*, &c.; Cumberland, *Anecdotes of eminent Painters in Spain*; Cean Bermudez, *Diccionario Historico*, &c.)

CANO'NICA, LUIGI, one of the most eminent of Cagnola's contemporaries [CAGNOLA, P. C. S.], executed many public and private buildings at Milan. Among his principal works, that which is the most noted and the most remarkable for its purpose and character, is the so-called Arena, or Amphitheatre, which, in regard to mere extent of plan, more than rivals the Colosseum at Rome, being an ellipsis of about 800 by 400 feet; but it is comparatively a mere spacious enclosure, surrounded by not more than eight rows of gradini, or seats, rising no higher than twenty feet from the ground. The principal entrance is at one extremity; and on one side in the centre of the longer axis, is an elevated pulvinare, or loggia, intended for the viceroy, and adorned with eight Corinthian columns of red granite. This singular edifice was begun in 1805, by order of Napoleon, who then sought to propitiate his Milanese subjects by embellishing their capital.

Canonica was employed on several other buildings at Milan, but the fame of the beautiful Palazzo Bellotti cannot be claimed for him, although it has been attributed to him. His chief works there are the Palazzo Orsini (the interior), the Casa Canonica, and the two theatres, Ré and Carcano. He also built three other theatres, at Brescia, Mantua, and Parma, or rather, the last was only executed from his designs, by Betoli. Canonica died at Milan, in February, 1844, at the age of eighty-two, leaving a considerable fortune, and making several munificent bequests, one of them the sum of 174,000 francs (about 7000*l.*) to the Primary Schools of Lombardy; another 87,000 francs to the Milan Academy of Fine Arts, the interest of which is to be devoted annually to the education and support of some young artist, architect, painter, or sculptor.

CANOPPI, ANTO'NIO, an Italian artist, who resided during the latter half of his life in Russia, and died at St. Petersburg, in 1832, at the age of fifty-nine. His father, who was civil engineer in the service of the Duke of Modena, and was esteemed one of the ablest of his day in that profession, educated him. But though he profited by the instruction bestowed upon him, Antonio soon relinquished science for art—construction for design. He aspired to build after the manner of Piranesi, the study of whose works filled his imagination with visions of architectural pomp, which he had afterwards opportunities of displaying when he began to paint for the stage. His first practice however was as a fresco-painter, in which capacity he was employed by many Italian nobles to decorate their saloons. At this period, he obtained the notice of Canova, who did much to recommend him, and also gave him instruction in sculpture. At Venice he became scene-painter at the Fenice theatre, and was afterwards engaged in the same capacity at Mantua, where some of the scenery executed by him is said to be still preserved for the sake of its beauty. While he was thus winning public admiration, a cloud was suddenly thrown over his success by the political changes of the time, or rather, in consequence of the active part he took in them, which was such that he was marked out by the French government as a very dangerous opponent, one that was at all events to be got rid of. Finding his personal safety threatened by the emissaries of Napoleon, Canoppi fled to Germany, and having made his way to Vienna, was so fortunate as there to meet with a protector and patron in the Russian ambassador Prince Razumovsky, who proposed to him to establish himself in Russia. Accordingly, furnished with letters of recommendation by the prince, he proceeded to Moscow in 1807, where he was fully employed for several years, chiefly in adorning with mural painting and arabesque decorations the saloons of the principal nobles. The hall of the Senate thus embellished by him excited general and lively admiration, but that and all his other labours of the kind in that capital, perished in the memorable conflagration of 1812. Just before that event Canoppi had sought an asylum at St. Petersburg, where he was already known by reputation, and was readily engaged as scene-painter at the Imperial Theatre, in which service he continued till his death, with the exception of the interval of a twelvemonth, when being ordered (1819) to travel for the benefit of his health, he visited the regions of the Caucasus. Among the vast number of splendid architectural scenes which he produced for the theatre at St. Petersburg, in the course of nearly twenty years, those for the operas of the Zauberflöte and Semiramis were considered truly wonderful performances of their kind; and the name of Canoppi was enrolled with those of Sanquirico, Quaglio, Schinkel, and other great scenicisti. His engagements with the theatre did not however so completely occupy Canoppi as to prevent his exercising his pencil upon smaller subjects and easel-pieces. These were chiefly either architectural compositions or architectural views, such as those of the Winter Palace (the one destroyed by fire in 1838), and the Etat Major at St. Petersburg; both which are or were in the Gallery of the Hermitage. But he sometimes took historical, or rather, poetical subjects; among others, two from the descent of Æneas to the infernal regions, one representing Tartarus, the other the Elysian Fields; also a Bacchanalian Scene, re-
markable for the masterly combination of two ligh
the moon in the landscape and that of torches
temple. The Interior of a Convent is another g
mired piece by him.

Besides having a considerable taste for literature.
wrote on various subjects appertaining to his art, p
and architecture included; and there is one publ
him, which appeared in 1830, entitled 'Opinion
Canoppi sur l'Architecture en général, et en spécia
Construction des Théâtres Modernes.'

(*Khudozhestvennya Gazeta*, No. 22, Nov. 1837.

CANTARI'NI, SIMO'NE, called Il Pesarese,
at Pesaro, in 1612, and in his youth was the schola
dolfi; but he afterwards chose Guido Reni for his m
lived some time with him in Bologna. He very short
himself to be a formidable rival, even to Guido hin
he was of such a contemptuous and arrogant dispos
he made enemies of all the painters of Bologna, an
people too, so that he became at length totally negl
avoided by the Bolognese, and he accordingly fe
compelled to leave Bologna. He removed to Rome
a high reputation there, and in some respects, esp
grace of conception, was pronounced to be superi
master Guido: even Count Malvasia, himself a B
styles Cantarini the best colourist and the purest
of the seventeenth century. After spending som
Rome, he returned to Bologna, and opened a sch
which however he gave up shortly afterwards, upon
an invitation from the Duke of Mantua to visit that
bane of his life however, his own conceit, follow
Mantua, where by his arrogance and the depre
others he very soon disgusted the artists of that
he finally quarrelled with the duke himself, about
with which the duke was not satisfied. From M
went to Verona, where he died, in 1648, aged only
under the suspicion of having been poisoned.

Cantarini's fault was not so much an exaltation o
works beyond their merits, as a denial of merit
He was certainly a great painter, as far as execut
make him such; in the extremities he was perhap
and has had few rivals; he showed also great mast
general management of the nude; in draperies he
successful. He painted a few altar-pieces, several
lies, and many portraits, in which he was admirable
is a head of Guido, when old, by Cantarini, in the
Bologna, which cannot be surpassed, and has perha
been equalled. His masterpieces are, Sant' Anto
Franciscans at Cagli; San Jacopo, in the churc
saint at Rimini; a Magdalen at the Philippine
Domenico at the Predicants, and several others,
the portrait of a young nun, at Pesaro. He et
several plates in a masterly manner, some of which
as the works of Guido.

(Malvasia, *Felsina Pittrice*; Lanzi, *Storia Pitto*
Bartsch, *Peintre-Graveur*.)

CA'NTHARUS, a genus of Acanthopterygiou
fishes, established by Cuvier for the reception of ce
cies belonging to the family of *Sparidæ*, and pres
common character of—a deep compressed body; a si
gated dorsal fin; a short muzzle; and teeth which
numerous, crowded, conical, and ranged in several r
of the external row being strongest and most curv
fishes of this genus inhabit the Mediterranean and
One of them, the Black Bream of Montagu (*Cant*
seus, Cuv. and Val.), is not uncommon on the south
of England, where it enters harbours and feeds on ma
tables, though it will take bait like other fish. It
length of 20 inches, and is of a bluish grey colou
with alternate light and dark narrow longitudinal
centres of the scales being darker than the edges.
fin is pale brown, and lodged in a groove throughout
the other fins are grey; the ventral, anal, and caud
darker than the pectoral.

Besides *Cantharus griseus*, three other Europe
are enumerated by Cuvier: *Cantharus vulgaris*,
and *C. orbicularis*. There are eight exotic specie
coast of Africa and the Indian seas.

(Cuvier and Valenciennes, *Hist. Nat. des Pois*
and Yarrell's *History of British Fishes*, vol. i.)

CANTO'NI, SIMONE, a recent Milanese a
considerable note, was born at Maggio, a small
the north of Italy, and received his first instructio
tecture from his father Pietro, who was of that

good deal at Genoa. He afterwards went to Rome
improvement, and on his return settled at Milan,
first work of any note he was employed upon was
Mellerio. Two other noble mansions afterwards
him in the same city, are the Casa Perticati and
o Serbelloni, the former of which has engaged
the Ionic order, with Caryatid figures over them,
attic; and the façade of the other (finished 1794)
ole for having granite columns and pilasters. Among
ier works, he erected the Seminary and Lyceum at
Villa Raimondi near the same town, the Palazzo
t Bergamo, and the church at Gorgonzola, between
nd Milan. On the destruction of the Great Coun-
the Ducal Palace at Genoa, by fire, in November,
toni was employed to rebuild it, which he did with
ity and taste, and in such manner as to secure it
similar accident in future. Milizia, who notices
nstance in his Life of Rocco Pennone, the origi-
ct of the edifice, says that there is a work contain-
ntoni's designs for that purpose, but he does not
her its title or date. Wiebeking attributes the
Mantua to Cantoni, but it would it seem errone-
nention being made of it in the memoir of him by
Tipaldo's 'Biografia,' &c., where he is said to
ted flattering invitations from St. Petersburg and
He died March 3, 1818. Nagler, who makes
of Simone, speaks of a Giuseppe Cantoni of Forli
hitect of the amphitheatre at Mantua (which was
1821); therefore he is, no doubt, the person meant
king.

ONMENTS are the dwelling-places occupied by
luring any suspension of active operations in the
TICS, p. 512, P. C.]: the term, though frequently
winter-quarters, particularly designates the more
shelter which an army may occasionally take; for
luring a season of excessive heat. The troops are
in villages, houses, &c., as when in winter-quar-
hey are made to occupy a smaller extent of country,
themselves in readiness to take the field at a mo-
ning.

TCHOUC. At the time when CAOUTCHOUC,
written, 'water-proof' cloth for capes and other
ormed perhaps the best known among the applications
terial to the arts. But the use of caoutchouc has
ery largely since that time, and seems likely to do so
n future, when its peculiar qualities are considered.
lities on which the manufacture depends are mainly
city and *imperviousness to water*; and nearly the
e recent applications of the gum in the arts depend on
er of them. We may begin by the former, viz., elas-
notice a few of the recent inventions bearing upon it.
oduction of caoutchouc, or India-rubber, as one of the
materials for braces, springs, straps, bandages, and
articles, depends on its power when in a filamentous
ing stretched out to a considerable length, and of
its former length without rupture. For such pur-
mpound thread is formed, having a centre or core of
, with an envelope of cotton or worsted twisted
The method is said to have been first practised
, from whence it extended to Paris, and thence to
y. The bottle-shaped masses of India-rubber are,
instance, cut up into slips. This used in the first
be done by cutting up the bottle with scissors, and
ating the layers of which it is formed; another plan
ten the bottle, inflate it by a forcing-pump to the
egree of thinness, and then cut it; but the method
yed is to soften the bottle in hot water, cut it into
, press it between two iron plates till it assumes
, and cut the discs or pieces thus produced into
a cutter working spirally from the circumference
c towards the centre. The ribbons so prepared
ut into filaments or threads of the desired width,
them through a machine having a number of
lges. The threads are softened in warm water,
hed by a winding machine to many times their
gth; and being kept in that tended state till cool,
t spring back again when released. They are then
a braiding-machine, and are sheathed with threads
silk, linen, or other material. The threads so
re used as 'warp' or long threads, and are woven
nd of textile fabric required. A heated iron passed
oven goods causes the India-rubber to relax, corru-
sheathing, and gives to the whole a great elasticity
and power of yielding without fracture. If the India-rubber thread were sheathed while in the natural state, it could not afterwards be stretched without breaking the sheathing; and it is for this reason that the sheathing is applied to a stretched thread of the inner material.

Sometimes the compound threads sheathed in this way are used as alternate warps only, sometimes both for warp and weft; and various other modifications occur, according to the purpose to which the woven material is to be applied. Gloves are made at Leicester and Nottingham with India-rubber knitted into the wrist; and stockings with the same material at the top, to serve in lieu of garters. In India this material has been in some cases used as a substitute for leather in soldiers' belts and other parts of their accoutrements. About four years ago a method was introduced of employing India-rubber, combined with other materials, as a substitute for corks for bottles. In the first place, fibres of wool are felted or worked into a cylindrical mass; this cylinder is cut up into pieces the proper length for corks; and the corks so made are coated with a thin sheeting or cover of India-rubber. The corks so made are said to close the bottle air-tight, and yet to be removed easily.

Another mode of applying this substance in respect to its elastic property, is for pavements for stables, lobbies, and halls. The idea of substituting this kind of pavement for that made of stone, seems to have arisen from the desirability of providing a flexible and yielding footing for horses in the stable. Some of the stables at Woolwich Arsenal are paved in this way; so likewise is the Admiralty Court-yard, and the carriage-entrance court at Windsor Castle. For all such purposes as these the India-rubber is combined with other materials. A project has been started for building boats of cork and India-rubber, in such a way that they shall be too light to sink and too elastic to fall to pieces in case of being thrown against a rocky shore. The elasticity of this substance has also caused it to be proposed as a material for the lining of vessels to prevent accidents from gun-shot splinters; and for hammock-nettings and bulwarks, to protect the crew from shot.

The *imperviousness to Water*, the other principal quality possessed by India-rubber, is rendered available by using a solution of the gum as a varnish or coating to the substance to be protected. When cloth is saturated with a solution of caoutchouc, it becomes not only water-proof but air-proof, and is then applied for such purposes as are noticed under AIR-BEDS AND CUSHIONS, P. C. S. Its water-resisting power is that which makes it available for clothing, and for safety-boats and other like contrivances. [BUOYS AND LIFE-PRESERVERS, P. C. S.] For all such purposes as these the gum requires to be brought to a melted state before using; and many recent inventions have had for their object the best mode of effecting this solution. Besides the life-boats mentioned in the article just named, other forms of vessel have been devised, having India-rubber among their component materials. In 1839 pontoons were made of India-rubber cloth, and floated on the Serpentine, two of them bearing a platform on which forty men stood. In the next following year a boat made of India-rubber cloth was floated on the Neva at St. Petersburg, and another on the Hudson in America, both bearing several persons. The canvas for soldiers' tents, in France, is sometimes saturated with the solution of this gum; and rick-cloths are occasionally so treated in this country.

CAPELL, EDWARD, was born in 1713, at Troston in Suffolk. He was educated at Bury St. Edmunds, and spent the greater part of his life at Hastings and in London, occupying himself almost exclusively in studies relating to the works of Shakspere. He was enabled to command leisure for such pursuits by the patronage of the Duke of Grafton, who obtained for him the appointment of deputy-inspector of plays. He died on the 24th of February, 1781, at his chambers in the Temple. As a commentator on Shakspere, Capell is ranked much more highly now than he was in his own times, but he is really useful only as furnishing hints for others to work upon. There is not more excellence in the valuable parts of his matter, than confusion, obscurity, and pedantry in his manner of expression. 'The man,' said Johnson, 'should have come to me, and I would have endowed his purpose with words: as it is, he doth gabble monstrously.' The publications written or edited by Capell are the following:—1, 'Prolusions, or Select Pieces of Ancient Poetry,' 1760, 8vo.: a volume in which the most interesting part is the fine drama of 'Edward III.,' attributed by its editor to Shakspere on grounds quite inconclusive. 2, 'Mr. William Shakespeare, his Comedies, Histories, and Tragedies,' &c., 1767, 10 vols. 8vo. 3, 'Notes and Various Readings to Shakespeare,' 1775, 4to. 4, 'A Letter to George Harding, Esq.' (on a passage in Steevens's Preface), 1777, 4to. 5, 'Notes and Various Readings to Shakespeare; to which is added, The School of Shakespeare, or Extracts from divers English Books that were in print in the Author's time,' &c., 1783, 3 vols. 4to.

CAPITAL is a term used in commerce to express the stock of the merchant, manufacturer, or trader, used in carrying on his business, in the purchase or manufacture of commodities, and in the payment of the wages of labour; and is understood not only of money, but of buildings, machinery, and all other material objects which facilitate his operations in trade. The term itself and the practical qualities and uses of capital are sufficiently understood in this its commercial sense; but it is the object of the present article to treat of capital in a more extended form, as within the province of political economy, and embracing not only the capital of particular individuals, but the entire capital of a country. In this latter sense, capital may be defined as the products of industry possessed by the community, and still available for use only, or for further production.

To consider capital in all its relations to the material interests of man, to the increase of population, the employment and wages of labourers, to profits and rent, it would be necessary to travel over the entire range of political economy; but this article will be confined to the following points:—I. The origin and growth of capital. II. Its application and uses.

I. Capital is first called into existence by the natural foresight of man, who even in a savage state discerns the advantage of not immediately consuming the whole produce of his exertions in present gratification, and stores up a part for his future subsistence. The greater proportion of mankind possess this quality, and those who do not possess it are admonished of its value by privation. In civilized life there are many concurrent inducements to accumulate savings; of which the most general are—the anxiety of men to provide for their families and for themselves in old age; social emulation, or their desire to substitute the manual labour of others for their own, and of advancing themselves from one grade to another in society; and a love of ease and luxury, which can only be purchased by present sacrifices.

A desire to accumulate some portion of the produce of industry being thus natural to mankind and nearly universal, the growth of capital may be expected wherever the means of accumulation exist; or, in other words, wherever men are not obliged to consume the whole products of their labour in their own subsistence. From the moment at which a man produces more than he consumes, he is creating a capital; and the accumulated surplus of production over the consumption of the whole community is the capital of a country.

Thus far the origin and growth of capital are perfectly intelligible; but in order to understand completely the progress of accumulation, it will be necessary to advert to certain matters which interfere with its apparent simplicity. As yet no distinction has been noticed, either in the original definition of capital or in the succeeding explanation of its causes, between those parts of the products of labour which are reserved for the reproduction of other commodities, and those parts which are intended solely for use or consumption. These two classes of products have been divided by Adam Smith and others into capital and revenue; by which division all products are excluded from the definition of capital unless they be designed for aiding in further production. The impropriety of this distinction however has been pointed out by Mr. M‘Culloch ('Principles of Political Economy,' p. 97), and it does not appear that any such division of the stock of a country is founded on a proper distinction. How can its future application be predicated? The fund exists, and so long as it is not sent abroad or consumed it must be regarded as capital. The whole of it may be made available for further production, or the whole may be consumed in present enjoyment; but no part is separable from the rest by an arbitrary classification. A man may choose hereafter to spend all his savings in drinking spirits and frequenting the theatres; or he may carefully lay them aside for the employment of a labourer in some profitable work: but in either case the stock has the same capacity for production while in the possession of the owner.

These different modes of expending capital produce very distinct results, both as regards the interests of the individual and of society, which will be examined under the second division of this article, where the application and uses of capital are considered; but here it must be observed that the accumulation of capital proceeds slowly or rapidl
portion as one or other of these modes of expenditu
prevalent. If men habitually consumed or wast
results of their industry, it is obvious that the eff
conduct would be precisely the same to themselve
venting accumulation, as if they were unable to ear
more than was absolutely necessary for their supp
true that they would enjoy more of the luxuries of
as will presently be seen, their expenditure would
indirectly, to the accumulation of capital by others
their labour would only suffice for their own sup
year to year, and no part of the produce of last ye
would be available, in the present year, either for
port or for any other purposes. But when a man,
spending the results of a whole year's labour within
subsists upon one-half of them, the other half rema
in the succeeding year, and in the course of two
economy will have placed him a whole year in adv

As it is evident, from these illustrations, that ca
increase in the ratio in which the products of labour
expense of subsistence, it would seem to follow as a
consequence that, when a certain amount of capital
been produced, the higher the rate of profit which
tainable from such capital, the greater will be th
further accumulation. [Profits, P. C.] It is not
indeed that larger savings should in fact be made, a
depend upon the conduct of those who enjoy the pr
larger their profits may be, the greater may be the
expenditure; and a taste for luxury and display
gendered, the gratification of which may be mor
than the desire of further accumulation. Nor can it
that, in practice, an unusually high rate of profits
encourages an extravagant expenditure. It is pe
natural that it should produce self-indulgence
stimulate economy. The accumulation of savings
self-denial very necessary and profitable, it is tru
very pleasing when the sacrifice is about to be ma
necessity is less obvious when large profits are rapi
than in less prosperous circumstances. When
arising from a man's capital, if expended, are alread
to satisfy his desires, we cannot wonder if he th
the morrow.

Yet, whether savings proportionate to the mean
be made or not, it is undeniable that a high rat
offers the best opportunity for augmenting capital.
per cent. profit upon a man's stock will enable him
as he has been accustomed, and to lay aside on
annually as capital, the rise of profit to six *per*
at once give him the power of adding four per ce
of one, to his capital, so long as he made no cha
style of living: and thus the doubling of the ra
would add to the means of accumulation in the p
four to one.

Making all due allowances, therefore, for great
of expenditure, the proposition that large profits
able to accumulation may be held as demons
reverse the circumstances, and suppose that prof
small as to disable those who were willing to save
ing any surplus whatever, the result must be p
same to themselves as if they had voluntarily co
whole excess of their production; while their po
not conduce indirectly to accumulation by othe
expenditure of a surplus might have done.

But, apart from abstract reasoning, does the e
different countries bear out the same conclusion? I
for example, was capital accumulated more ra
profits were high, than within the last few yea
questions do not always receive the same an
M‘Culloch compares the progress of the Unit
America, in wealth and population, with that of I
Holland, and ascribes the comparative rapidity
vancement to the fact, that the rate of profit is gen
as high in America as in either of the other coun
ciples of Pol. Ec., p. 107). He adds (p. 110),
rates of profit have become comparatively low, th
of a nation, 'how prosperous soever in appeara
and unsound at bottom.' Professor Jones, on the
denies this inference, and takes a more encourag
the state and prospects of our own country. He
fall of the rate of profits, which is so common a ph
to be almost a constant attendant on increasing po
wealth, is, it will be seen, so far from indicat
feebleness in any branch of industry, that it is us

creasing productive power in all, and by an
nulate fresh resources more abundantly and
So far therefore is this circumstance from
hastily been feared and described to be, an
m of national decay, that it will be shown to
ost constant accompaniments and indications
prosperity and vigour.' (*Distribution of*
e, p. xxxii.)
ns, apparently conflicting, upon matters of
, upon examination, not to be wholly irrecon-
oubtful whether the United States of America
le for the purpose of this inquiry, as there
concurrent circumstances in operation, in that
ding to the same result; and of which high
egarded as the effect rather than the cause.
therefore to confine the examination of the
rofits upon accumulation to our own country
s.

will be admitted on all hands that individual
en more rapidly accumulated in England at
hich the profits in particular departments of
he highest. This admission is no more, in
n the truism, that when a trade is prosperous
by it. The next question is, whether a high
n all departments of industry has the same
ting the sum total of national capital. Poli-
are too apt to assume a universal analogy
uals and nations, which is often deceptive,
ccurate conclusions. In the present instance,
were allowed, it would be decisive of the
, and would exclude all observation of facts.
ted by Professor Jones, is undeniable, that a
of profits is the ordinary accompaniment of
lation and wealth. There is more capital in
Holland, in proportion to the population, than
n the world, and in those countries the rate
owest. The resources of England have been
n extraordinary manner during the last forty
d by the productiveness of the property-tax
sts, compared with former periods, and as
statistics (Porter's *Progress of the Nation*,
at the same time, the more evident the wealth
as become, the lower has fallen the general

principles of profit have been briefly stated in
IT, P. C.; but here it may be mentioned, that
te of profits is a common result of enormous
f capital. Capitalists are forced into com-
ch other, and are ultimately obliged to content
lower profits. But, in the meantime, does
accumulation of national wealth diminish?
is contradicted by all the statistics which
ogress and present condition of Great Bri-
of 1841, P. C. S.] All evidence shows that
is positively overflowing, and seeking employ-
nterprise at home or abroad. It is true that
decide, with arithmetical precision, the com-
increase in the accumulation of capital at dif-
ut so far as outward indications of wealth may
ere are very few who are prepared to deny
n is now advancing, in the aggregate, at least
ver, in proportion to the population of the

is submitted, is nevertheless consistent with
position, that high profits are favourable to
n calculating the aggregate savings of a people
populous, it must be borne in mind, first,
g generation has inherited the accumulations
ng generations; and, secondly, that a large
ns continually saving a small portion of their
, may produce a greater aggregate accumu-
larger-proportionate savings of a less number

ce to the first point, it need only be observed,
ited capital be not squandered or wasted, its
alone affords the means of enormous accumu-
e rent of land, the profits of trade, and the
r, are continually supplying new funds for
on and accumulation. The second point may
r by an illustration. Let us suppose one
ch saving 100*l*. annually out of their profits.
e accumulations would amount to 10,000*l*.
thousand men, with equal capitals, but unable, on account of a lower rate of profit, to save more than 50*l*. a year; their aggregate accumulations would amount to 50,000*l*. In both cases, they would have maintained themselves and their families out of their profits, and have paid the wages of all the labour required in their business; after which their savings remain available for increased production, and for the employment of a larger quantity of labour. This example falls far short of the circumstances of Great Britain, for the number of small capitalists is even more extraordinary than the enormous capitals possessed by a comparatively small number of wealthy men; and their annual additions to the national capital are of incalculable amount.

The conclusions to which we are led by these inquiries, are,—that a high rate of profit is favourable to accumulation; that rich and populous countries are denied this advantage; that if they enjoyed it, their capital would continue to increase more rapidly than it does, in fact, increase; but that, under ordinarily favourable circumstances, the masses of inherited capital and the aggregate savings of vast numbers of capitalists still facilitate accumulation in a greater ratio than the increase of population, which a high state of civilization has a tendency to check. [POPULATION, P. C.]

II. The consideration of the application and uses of capital will be disembarrassed of much complexity by explaining, at the outset, the distinction raised by political economists between what is called productive and unproductive labour and expenditure. The end of all production is use or consumption: some products are immediately destroyed by the use of them, as food or coals; others are consumed more slowly, but are ultimately destroyed by use, as clothes or furniture: but whatever the durability of the thing produced, its sole use is the enjoyment of man. A man is rich or poor according to his power of obtaining the various sources of enjoyment which the skill and industry of others produce; and the aggregate of such permanent sources of enjoyment constitutes the wealth of nations. Whatever labour or expenditure, therefore, may be devoted to the increase or continuance of those sources of enjoyment, must be deemed productive: and labour and expenditure which have no such tendency must be viewed as unproductive.

The most scientific classification of productive and unproductive descriptions of labour and expenditure which we have met with is that of Mr. Mill. According to his definition the following are always productive:—When their 'direct object or effect is the creation of some material product useful or agreeable to mankind,' or 'to endow human or other animated beings with faculties or qualities useful or agreeable to mankind, and possessing exchangeable value;' or 'which, without having for their direct object the creation of any useful material product, or bodily or mental faculty or quality, yet tend indirectly to promote one or other of those ends, and are exerted or incurred solely for that purpose.' Labour and expenditure are said to be unproductive when they are 'directly or exclusively for the purpose of enjoyment, and not calling into existence anything, whether substance or quality, but such as begins and perishes in the enjoyment;' or when they are exerted or incurred 'uselessly or in pure waste, and yielding neither direct enjoyment nor permanent sources of enjoyment.' (*Essays on unsettled Questions of Political Economy*, Essay III.)

Examples of these several classes would transgress our limits, but a study of the above definitions may serve to correct an erroneous impression, that no expenditure is productive unless it be incurred directly in aid of further production. The most common form in which this error appears, is in a comparison of the ordinary expenditure of a gentleman living upon his income, with that of a person employing workmen in a productive trade. It is hastily assumed that the expenditure of the former is unproductive, but it is, in fact, of a mixed character. His servants, for instance, perform many labours of a productive character. His cook prepares food for his table, and thus adds the last process of a manufacture. In point of productiveness it is impossible to distinguish this necessary labour from that of a butcher or baker. His gardener is an agriculturist and directly productive. The upholsterer who makes his furniture is productive: and in what manner is the labour of his housemaid less productive, who keeps it fit for use? In the same manner, why is the labour of his butler less productive than that of the silversmith; or of his coachman than that of the coach-builder and the breeder of horses? All are engaged alike, in increasing or continuing permanent sources of enjoyment. But the most important economical use of domestic servants is the division of employments which it facilitates. While they are engaged upon household services their employer is free to follow his own more influential duties—the management of his estates, the investment of his capital, or the labours of his profession. It is not, therefore, in the employment of servants that expenditure is unproductively incurred, but in the employment of excessive numbers; for then they are used directly and exclusively for the purpose of an enjoyment 'which begins and perishes in the enjoyment.'

We will now briefly examine the nature of productive and unproductive consumption of perishable articles, and the effects of consumption, generally, upon production. Those who produce anything have one object only in devoting their labour to it—that of ultimately consuming the thing itself, or its equivalent, in the form of some other product of labour. If the exchange be made in goods, each consumer is obviously also a producer, and adds to the common stock of enjoyment as much as he withdraws from it. But money is the representative of the products of labour, and if given in exchange for them, the character of the transaction would appear to be the same as the direct interchange of the products themselves. In the case of productive labourers, it would be admitted to be precisely the same; but a distinction is taken when the labour of the consumer is itself unproductive. It is true that he offers the results of past labour, but his immediate end in consuming is enjoyment. He parts with his money, which is an equivalent to the seller, but he produces no new source of enjoyment for society. But the consumption of a productive labourer may also be unproductive. Such part of his consumption as is necessary to keep him in health, to render him perfectly fit, in mind and body, for his employment, and to rear his children, suitably, is all clearly productive. If any residue remain, and he spend it upon immediate enjoyment—such as spirits, for example, which vanish with the enjoyment—that portion of his consumption is unproductive.

It must not be imagined, however, that the only result of money spent upon unproductive labour or of unproductive consumption, is necessarily waste. The results of a man's labour may be unproductive to society, but a great part of his gains may be productively expended; and again, the maker and seller of commodities unproductively consumed are productive, and their profits may be productively employed. The distiller and the publican are productive labourers, but the consumption of spirits is itself unproductive.

We are now enabled to confine our attention to the uses of capital as applied to its most important end, the employment and aid of productive industry. Its first and most important use is the division of employments, which, though necessary for any advance in arts, is impracticable without some previous accumulation of capital. Until there is a fund for employing labour, every man's business is the seeking of his own daily food; but as soon as the capital of another secures that for him, his labour is available for the general good. The more capital is accumulated, the more extended are the facilities for indefinite distribution of employments, according to the wants of the community.

Capital may be applied either directly in the employment of labour, or directly in aid of labour: it may be spent in the food and clothes of labourers, or in tools and other auxiliary machinery to assist their labour and increase its productiveness. The former is usually termed circulating capital, and the latter fixed capital. Both are equally essential to the progress of the arts and national wealth, and are used in combination; but the effects produced by each are not always the same. If a farmer employs three labourers, and his capital is afterwards doubled, it is a very important question whether he expend his increased stock in the payment of three additional labourers, or in providing auxiliary machinery to increase the power of the three labourers already employed. In the latter case we may be assured that his machinery will do the work of more than three men; for otherwise no ingenuity would have been applied to its contrivance. It is truly said by Professor Jones, that, 'when, instead of using their capital to support fresh labourers in any art, (a people) prefer expending an equal amount of capital, in some shape in which it is assistant to the labour already employed in that art, we may conclude with perfect certainty, that the efficiency of human industry has increased relatively to the amount of capital employed.' (*Distribution of Wealth*, p. 222.) The same able writer has pointed out another difference in the results of auxiliary capital, viz., 'that when a given quantity of addi[illegible]l is applied, in the results of past labour, to assist [illegible]ally employed, a less annual return will suffice to make the employment of such capital profitable, a therefore permanently practicable, than if the same quantu of fresh capital were expended in the support of addition labourers.' (*Ibid.* p. 224.) This circumstance arises fr the greater durability of the fixed capital, which may not r quire renewal for several years, while the direct expendit on labour must be renewed annually. Thus 100*l.* spent labour to cause a profit of 10 per cent. must produce resu amounting in value to 110*l.*; but the same sum expended up any machinery calculated to last for five years would be equal well repaid by a return of 30*l.* a-year; being 10*l.* for profit up the outlay, and 20*l.* for the annual wear and tear of the capit

Not only does capital facilitate divisions of employmen and increase the productiveness of industry, by which the e joyments of man are multiplied, but it actually produces ne sources of power and enjoyment, which without it could ha no existence. It is the foundation of all social progress a civilization, for without it man is but a savage. It must pr cede his mental culture, for until it exists his noble endo ments are idle or misemployed. Without it, his mind is slave to the wants of his body: with it, the strength of othe becomes subservient to his will, and while he directs it to i crease the physical enjoyments of his race, his intellect rang beyond the common necessities of man, and aspires to wisdom-to government and laws—to arts and sciences. In all the n tions of the world riches have preceded and introduced i tellectual superiority. Connected with the progress of th human intellect, the printing press is an apt example of th creations, so to speak, effected by capital. No dexterity fingers, no ingenuity of contrivance, unaided by the results former labour, could multiply copies of books. Without abun ance of types and frames and other appliances of the a secured by capital, the bare invention of printing would useless; and its wonderful efficacy, in the present age, m be ascribed as much to the resources of capital as to hum ingenuity. In numberless other processes of art capital e ables work to be executed which could not otherwise be p formed at all, or enables it to be performed better and in l time. In all ways it multiplies indefinitely the varied sour of enjoyment that are offered to civilized man; but ne more conspicuously than when it stimulates and encoura invention. Look at the railways of Great Britain. W created them? The abounding capital of the people, whi overflowing the ordinary channels of investments, found a n channel for itself. In ten years the land was traversed by i roads, and millions of people were borne along by steam w the speed of the wind.

This rapid sketch of the uses of capital will not be compl without its moral. The paramount value of capital to prosperity of a nation should never be overlooked by a gove ment. Unwise laws, restrictions upon commerce, imp vident taxation, which are unfavourable to its growth, sho be dreaded as poison to the sources of national wealth happiness. No class is the better for its decay or retar growth: all derive benefit from its increase. And above when population in rapidly increasing, let a government ware how it interferes with the natural growth of capital, the fund for the employment of labour should fail, and numbers of the people, instead of being an instrument of tional power, should become the unhappy cause of its dec The material happiness of a people is greatest when the tional wealth is increasing more rapidly than the populati when the demand for labour is ever in advance of the supp It is then also that a people, being contented, are most ea governed; and that taxes are most productive and raised w least difficulty. But while the natural growth of capital sho not be interfered with by restrictions, the opposite error forcing it into particular channels should equally be avoid Industry requires from a government nothing but freedom its exercise; and capital will then find its own way into most productive employments; for its genius is more fer than that of statesmen, and its energy is greatest when lef itself. The best means of aiding its spontaneous developm are a liberal encouragement of science and the arts, an judicious system of popular education and industrial trainin for as 'knowledge is power' so is it at once the best of riches and the most efficient producer of wealth.

(Smith's *Wealth of Nations*, Book ii. ch. 3, with N by M'Culloch and Wakefield; Ricardo *On Political E nomy and Taxation*; M'Culloch, *Principles of Polit Economy*; Professor Jones *On the Distribution of Weal Essays on some Unsettled Questions of Political Econo* by John Stuart Mill.)

APITE, TENANTS IN. [Baron, Barony, P. C.; AL System, P. C.]

A'PITO, ATEIUS C. [Labeo, P. C. S.]

APRIFO'LIUM. [Lonicera, P. C. S.]

APS, PERCUSSION. There have been three modes ted, in different times, for firing off muskets, fowling- s, and other kinds of hand-guns, viz. the *match*, the *flint teel*, and the *percussion cap*; the last of which depends principle on modern chemical discoveries.

has been stated [Arms, P. C.] that the first kind nd-gun, called the hand-cannon, was fired by a match ed to the priming at the touch-hole; and that the first ach towards the use of a gun-lock was by placing a small at the right hand of the touch-hole to contain the priming- der, to prevent it from being blown away. The match applied by hand; but in the *arquebus*, a later invention, s brought over the touch-hole by means of a trigger, such d before been used for shooting the arrow from a cross- . Next came into use the wheel-lock, in the time of ry VIII.; this was a contrivance by which sparks of fire e elicited from a furrowed steel wheel, by friction against ece of pyrites, or sulphuret of iron: the trigger acted on a r and chain which made the wheel revolve, and also ght the piece of pyrites down in contact with it, so that grating of the two together might produce a spark sufficient kindle the priming of the gun. The next improvement sisted in the substitution of a flat furrowed piece of steel the wheel, and a piece of flint for the pyrites. By gradual provements made from time to time, the complicated ngement of the flint and steel assumed a considerable gree of perfection, and made the gun-lock a very curious ce of machinery. The manufacture of these locks has med, and still does form, an important branch of Wolver- mpton trade; while the manufacture of the flints, especially ing times of war, has been largely carried on in various parts England and the Continent where the best flint is found.

The employment of percussion caps, instead of the above ntrivances, arose out of the discovery of certain chemical sub- nces which will explode by percussion or a blow without aid of heat. Such substances are called detonating or inating compounds; and the idea of employing them for muskets is said to have originated in the following ner:—About the year 1793, on account of a scarcity of petre in France, the French government caused experi- nts to be made to determine how far a certain preparation chlorate of potash would answer as a substitute for gun- wder. The attempt was, from various causes, unsuccessful; t it suggested to the mind of Mr. Fordyce, a gentleman of tland, the thought of employing some such agent for ing the gunpowder of a loaded gun. After several ex- iments, he took to London, in 1806. a fowling-piece having k, in which a small piece of apparatus struck smartly against el of fulminating mercury, exploded it, and caused the ion of the gunpowder. The principle was established, gh the details were still imperfect; and Mr. Fordyce was raged by the then Master-General of the Ordnance to e further experiments, which he did. Fordyce proposed, his reward, to be paid the price of the gunpowder which d be saved by the government in two years; but changes dministration, and difficulties of various kinds, interfered the hoped-for progress of the method; and it was not many years afterwards that its use became at all extensive England, or indeed anywhere.

When however it became known that a slight blow would lode certain powders, and that this explosion would ignite powder, numerous improvements became introduced by rees. Various salts and chemical compounds, such as e of the chlorates, nitrates, and fulminates, will explode his way; the most familiar example of which is afforded the 'lucifers' or 'congreves' now sold so cheaply in the ts, and which ignite so readily by friction (in effect ries of minute percussions). About twelve or four- years ago Dr. Ure conducted a series of experiments the Board of Ordnance on certain points connected with e detonating compounds; such as the best proportion in ingredients for fulminating mercury and other varieties; best mode of preparation; the mode in which gases pro- ed by the explosion affect the iron and brass work of a ; the degree to which moisture or damp injures the mix- s; the effect of difference of climate on them; the best e of protecting them from injury; and the probable effect he gases (resulting from the explosion) on the health of a e mass of men in an army. Dr. Ure gives the results of the experiments in his 'Dictionary,' in the course of which he states that the French prepare forty thousand percussion charges from two pounds and a half of fulminating mercury.

When the method was first introduced, there was some difficulty in causing the explosion of the mixture to ignite the gunpowder. But this is now effected by putting the detonating mixture into a little copper box or cell called a *cap*, which is adjusted over the touch-hole, and so arranged as to the other part of the lock, that a smart blow bursts the cap and explodes its contents: the little cell itself is destroyed, so that a new one is required for each firing. The size of the cell, or 'percussion-cap,' the nature of the mixture, the quantity employed with each charge, and the mechanism for firing it, have been the subjects of many improvements within the last few years, some of which are patented. The caps are now made in large numbers at Birmingham, in much the same manner as metal buttons; blanks being cut out of sheet copper or mixed metal, and stamped or pressed into the proper shape. One of the recent inventions has been to make the cap double, or one cap within another, with the mixture between the two, and a small hole in the inner one to communicate with the gunpowder.

Many contrivances have also been suggested for applying these caps under a modified form to larger guns. Thus, Commander Henderson, in 1838, contrived a means whereby a ship's armourer could adapt percussion caps to the common guns of a ship. The cap is applied to the touchhole, covered with an iron cap, and exploded with a slight blow from a mallet.

The detonating compound, with or without the small containing copper cap, has been applied to several varieties of shells to be fired from mortars, and to explode only when the shell strikes against the object against which it is directed. In ordinary circumstances a bomb-shell, or similar missile, has a fuse so attached to it as to ignite the gunpowder within after a certain space of time; but the object of the detonating shells is to dispense with such a fuse. Colonel Maceroni, in 1826, proposed the use of shells in which a short tube was screwed into one side of the shell, and a percussion-cap placed in the tube, just before the shell was to be fired from the mortar: the striking of the shell against any solid object exploded the compound, ignited the gunpowder, and burst the shell.

Many other such shells have been from time to time proposed, of which those by Captain Norton were a good deal noticed in the public prints two or three years ago; the experiments at Woolwich, in 1842, with these shells, were made with the view of determining whether the shell would be *certain* to explode in striking the object. Another contrivance by Captain Norton was to make a shell explode when it reached the bed of the sea, but not before: there is an iron tube screwed into the shell, and an iron rod suspended within the tube by a piece of quill; a kind of wing or sail keeps the shell in one position during its descent through the water; and on striking the bottom, the iron rod falls through the tube, and a percussion cap attached to its lower end explodes. Another contrivance is to aid submarine explosions, for blasting or other purposes: a box filled with gunpowder is lowered to the bottom of the river or sea, and a sounding-lead provided with a percussion cap is guided down by a string so to strike the box, to explode the cap by the blow, and to ignite the gunpowder by the explosion.

Percussion caps are now used very extensively by sportsmen, and are also being gradually introduced into many of the armies of Europe.

CAPSELLA, a genus of plants belonging to the natural order Cruciferæ, the suborder Angustiseptæ, the tribe Lepidineæ. It has a triangular-obcordate pouch, compressed valves, keeled but not winged; numerous seeds, simple filaments. The species of the Linnæan genus Thlaspi, without wings to their valves, form this genus. The best known is the common Shepherd's Purse (*C. Bursa Pastoris*). It is an annual herb, very variable in habit, a follower of man, and springs up wherever he fixes his abode. As a weed it is frequently very troublesome in gardens. It may be got rid of by hoeing in hot and dry weather whilst it is in flower, but if it be allowed to ripen its seed, it is with difficulty eradicated. Koch describes several varieties of this plant. He also describes two other species as inhabitants of Germany, *C. procumbens* (*Lepidium procumbens* of Linnæus), and *C. pauciflora*, apparently a variety of the last.

(Koch, *Flora Germanica*; Babington *Manual Brit. Bot.*)

CAPSTAN. [Windlass, P. C.]

CARADOC FORMATION, the uppermost of the two great divisions of the lower Silurian strata of Murchison. It is not well and clearly seen except in Salop, the Abberley and Malvern Hills, Woolhope, May Hill, and other points on the eastern borders of Wales.

CARA'GLIO, GIANGIA'COMO, a very celebrated old copper-plate, medal, and gem engraver, born at Verona or at Parma, about the commencement of the sixteenth century. He was the pupil of Marcantonio at Rome, and is one of the best of the early Italian engravers. His prints are rather numerous, though their number has not been accurately ascertained. Bartsch describes sixty-four; and Brulliot knew only of sixty-five. In the latter part of his life Caraglio gave up engraving on copper, and confined himself to medal, cameo, and gem engraving, an art in which he obtained so great a reputation, says Vasari, that Sigismund I., King of Poland, invited him to Warsaw to execute some works for him. He returned to Italy well rewarded, and died about 1570, at his own estate in the neighbourhood of Parma. The fact of his settling in the Parmesan territory is in favour of the supposition that Parma was his native place: he signs himself Parmensis on several of his works, yet more are signed Jo. Jacobus Veronensis; some Jac. Caralius.

He engraved after Il Rosso, Raphael, Titian, Michelangelo, P. del Vaga, Julio Romano, Parmegiano, and other famous masters. His heads are well executed, as is the nude generally, but the draperies are hard and unnatural: his lines are distinct and show great mastery for the period, but he did not reach the excellence of his master Marcantonio.

(Vasari, *Vite de' Pittori*, &c.; Bartsch, *Peintre-Graveur;* Brulliot, *Dictionnaire des Monogrammes*, &c.)

CARAVA'GGIO, POLIDO'RO DA, a celebrated Italian painter, born at Caravaggio about 1495; his family name was CALDARA. When he was eighteen years of age he was a labourer, and was with many others employed as such about 1512 in the Vatican, when Raphael was painting the loggie and stanze there, in the pontificate of Leo X. He appears to have taken great interest in the progress of the works, and he made some attempts at design himself, which had sufficient merit to induce Maturino of Florence, one of the assistants employed, to undertake to teach him to draw, for which he soon displayed extraordinary ability. A strong attachment grew up between the two young painters. Maturino employed Polidoro to assist him in his work. Their joint labour soon attracted the notice and admiration of Raphael, and Polidoro was considered, before those works were completed, says Vasari, the 'più bello e più nobile ingegno' of all the young painters employed.

Vasari evidently gives the greater merit to Polidoro, but as the later works which he painted when alone, were very different in style from these and others which were done in Rome in this period, in company with Maturino, some recent writers have ventured to give Maturino the greater credit. These works were in fresco and in light and shade, or what the Italians call *chiariscuri*, and consist mostly in friezes and other decorations in imitation of bronze or marble, applicable for buildings, interiors or exteriors. Their figures, of which they were not sparing, were drawn in a pure antique style, and not inferior in that respect to the works of any modern master. They imitated antient statues and bassirilievi, and antient sculptured ornaments of any kind. Vasari says that there was not a fragment of antient ornamental art in Rome which they did not copy; they painted also original works from sacred and modern story. Of all these works however, scarcely a vestige remains, but some are in a measure preserved by the prints of Cherubino Alberti, P. S. Bartoli, and Galestruzzi. The last engraved, in five sheets, the story of Niobe, which Maturino and Caravaggio painted as a frieze on the façade of a house opposite the Palazzo Lancellotti: it was one of their masterpieces.

The sack of Rome, by the soldiers of Bourbon in 1527, put an end to the joint labours of Polidoro and Maturino; they both fled, but Maturino is supposed to have returned, and to have died of the plague, in the same year. Polidoro went to Naples, where he was received into the house of Andrea da Salerno: he practised there some time, but finding that his works were not duly appreciated, he removed to Messina. Here, in 1536, upon the visit of Charles V., on his return from his victorious expedition to Tunis, he was intrusted with the conduct of the triumphal decorations on the occasion. He dwelt several years in Messina in high esteem, and executed many good works, not in his early style of chiariscuri, but in colours; and some of them were for altar-pieces; Vasari mentions a Christ led to Calvary amidst a crowd of peo
masterpiece. In 1543 he made up his mind to
Rome, having, to his misfortune, as it proved, amas
siderable sum of money. Polidoro had provided hi
a large sum of money, and all things were prepare
departure the ensuing morning; a servant whom he
many years was to accompany him. This wretch
loved his master's money much better than his pers
hired some assassins to strangle him during the nig
he was asleep, and shared his booty with the assassi
having stabbed the body of Polidoro in two or thre
carried it to the door of the house where a lady liv
he had been in the habit of visiting; and the serv
weeping and lamenting, and related the discovery of
to a certain count, a friend of Polidoro's. This co
ever eventually suspected the truth of the man's st
caused him to be put to the rack, upon which he ma
cumstantial confession of the whole infamous aff
miserable wretch was tortured with heated forceps,
and quartered, but as Vasari has observed, this did
Polidoro to life again: he was buried in the cat
Messina. Some of the pictures which he painted at
are in the Gallery of Naples. He excelled in lands
also etched several plates in a good style; they are
extremely scarce: the prints after him are likewise

(Vasari, *Vite de' Pittori*, &c.; Gandellini, *Notizie*
&c.; Lanzi, *Storia Pittorica*, &c.)

CARBONIFEROUS SYSTEM, the great grou
which includes nearly all the valuable coal yet d
It consists of

D. The coal formation.
c. *The millstone-grit group.*
B. The mountain limestone formation.
a. *The limestone-shale group.*

The portions marked *a*, *c*, are the least consta
and character; the limestone-shale graduates in So
to Devonian strata, and in Ireland constitutes the ye
stone series of the northern counties. (Griffith.)
the coal of Ireland belongs to the millstone grit gro

CARDAMINE, a genus of plants belonging to t
order Cruciferæ, the suborder Siliquosæ, and the
bideæ. It has a compressed pod, flat nerveless valv
tate stigma, the seeds in a single row, with the
simple and filiform. The species, which are num
usually smooth herbs, with stalked, entire, lobed, or
cut leaves, and racemes of white or red flowers.

C. pratensis, Cuckoo-flower, Bitter-cress, commo
Smock, has pinnate leaves, the leaflets of the lo
roundish, slightly angled, those of the upper leaf
ceolate, entire; the petals three times longer than
spreading, the stamens half the length of the pe
terete. This plant has large lilac-coloured flowers,
ceedingly abundant in some parts of the country.
bitter taste, hence its name Bitter-cress. It is ge
blossom when the cuckoo returns to this country, a
period covers the fields as though linen was bleachi
circumstances explain its other common English n
still retains a place in the London and Dublin Pharm
but why it is difficult to say. At one time it had
tation of being a diuretic and antispasmodic, and a
the flowers was administered as a dose in hysteri
epilepsy, and other nervous affections. It is a
Europe, Asia, and America, and is abundant t
Great Britain.

Babington describes four other species of Card
natives of Great Britain, *C. impatiens*, *C. sylvatica*, C
C. amara: with the exception of the last they ar
plants. *C. bellidifolia* has been figured in the 'Englis
as a British plant, but no station for it is known. T
of *C. hirsuta*, when ripe, and laid upon the ground,
buds which produce a new plant. It is extensive
gated in this way in moist soils. It is said that oth
have the same property. *C. impatiens* is so named
pods when fully ripened expanding suddenly with fo
touched, and throwing the seeds to a distance.

These plants are easily cultivated. Many of t
nial species are ornamental, but the annual and bie
cies look like weeds. They will grow in almost a
soil, but most of them prefer a damp shady situati
annual species may be increased by seed, the per
dividing the roots.

(Don, *Gard. Dict.*; Loudon, *Encyc. of Plants*;
ton, *Manual of British Botany.*)

CARDAMINE PRATENSIS—*Medical Properties of.* is indigenous herbaceous plant decorates our meadows and tures in April and May with its light purple reticulately ned flowers, which are the officinal parts. They possess iint mellifluous odour, which is nearly lost by drying. e taste is acrid and pungent, similar to but less agreeable n that of the common watercress, which is dissipated by . The chief constituents are a bitter extractive and a tile oil. To these it is indebted for such medical powers it possesses, which are very slight, and altogether insuffi- nt to entitle it to a place in the Pharmacopœia. It is said be stimulating, diuretic, and anti-spasmodic; and hence of vice in hysteria, chorea, and epilepsy. In some of the tter cases of these, dependent on irritation of the intes- l canal, from imperfectly digested food, unhealthy secre- s, or worms, it may, along with purgatives, bitters, and rcise, be of some benefit. It is however as an anti-scorbu- herb that it is best entitled to notice. The health of many ns is low in early spring from the want of green vegeta- during winter, and the blood passes into the condition ch obtains in persons suffering from scurvy. The use of h vegetables, such as this, and watercresses, with fruits, lemon-juice, will spedily remove this state.

ecture of Dr. Budd on *Scurvy*, in *London Medical ette*, vol. xxxii. p. 713.)

ARDI, LUDOVICO. [CIGOLI, P. C. S.]

ARDIFF. [GLAMORGANSHIRE, P. C.]

ARDS, CARD-MAKING MACHINE. In the cot- anufacture one of the early processes consists in disen- ng the fibres of cotton, so as to arrange them in a on more or less parallel, free from knots or other inter- ons. The instrument employed for this purpose is a of brush called a 'card,' set with wire-teeth disposed regular manner. The action of this instrument is very r to that of a comb for hair, or a heckle for flax and , the fibres being made to pass between the teeth, or the between the fibres, according to the arrangements of the anism. The wire teeth of the cards are inserted in care- prepared strips of leather, which used formerly to be d to flat handles or supports, but are at the present day round the exterior surface of a cylinder. Several such ders being arranged nearly in contact, and fibres of cotton laid within reach of one of them, the cylinders by their n catch up the fibres, pass them on from one to another, mb out or straighten them in the transit.

hen the manufacture was in a ruder and less important n than at present, these cards were made by hand; the r being dressed and cut, the holes pierced, the wire htened and brought to the necessary shape, the teeth cut d inserted into the holes in the leather, by persons who this a regular branch of employment. But machines ow employed to effect this, so intricate and beautiful in uction as to have been often alluded to as among the admirable pieces of mechanism known in our workshops ctories. It was in the year 1811 that Mr. Dyer, of hester, first took out a patent for one of these machines; ther patents were obtained in 1814 and 1824; and more tly further improvements have been made in the con- ion by Mr. Walton.

e machine consists of a large number of levers or rods, le of motion in various directions, and moving one after er in a particular and definite order. The different of work to be performed by it are so numerous and similar, that the mass of details becomes exceedingly lex, and not easily followed even with the aid of wood-

In the first place, the strips of leather which are to the cards are attached to the machine, in such a way as ft laterally as fast as they are supplied with wires. A of forks or points are thrust out, to pierce holes of the ite depth in the leather, and are drawn back again when s effected; sliding pincers unwind the wire from a coil, ring it forward, a moveable cutter descends upon each and cuts off a piece long enough for one of the teeth; a kind of stud or rod presses against the middle of the so cut off, and presses it into a staple-shape, with the oints parallel; each staple or tooth is seized by nippers, half-way into a hole in the leather, bent angularly by r piece of apparatus, so as to give an exactly determined ity to it, and lastly driven home to its proper depth in le. All this is effected by successive movements in the nt parts of the machine; and several teeth, forming in one row, are made and fixed at once. When one or series of the processes is completed, the leather is made to shift onwards through a small space, and to present a new surface for the reception of teeth.

The efficiency of the machine was such, even some years ago, that a steam-engine of five-horse power could set a hundred of them at work, while each machine could make and fix from a hundred to a hundred and fifty teeth in a minute; but successive improvements have so increased the power, that now four or five hundred teeth are formed in the same space of time. There are not often opportunities of seeing these beautiful machines, except in the Lancashire and Yorkshire districts; but occasionally they are exhibited at Mechanics' and Scientific Institutions. At an exhibition of works of art in Leeds, in the autumn of 1843, one of them was shown at work, the cards being properly filled by the agency of the same steam-engine which set many other pieces of mechanism in action.

So large is the consumption of this kind of 'garniture,' as it is called, for the carding-engines of the cotton districts, that it has been estimated four thousand hides and forty-eight thousand feet of wire are cut up weekly to make them. The wires are inserted in leather, because the flexibility of this material allows it to be bent round the surface of a cylinder. Patents have been recently taken out for improving the surface of these leathers. If a hard and tangled tuft of cotton occurs in the process of carding, the rigidity of the surface of the leather prevents the tooth from bending or yielding to the obstruction; and it has been proposed to remedy this by applying to the face of the leather, before the wires are inserted in it, a coating of woollen cloth, saturated with caoutchouc to render it very pliable. Another suggestion is for the use of a textile material, with a warp of hemp, flax, or cotton, and a weft of woollen, saturated in like manner with a solution of caoutchouc. But both are alike in their object, and have relation only to the minor working of the method, the card-making machine being independent of them.

CARDU'CCIO, the name of two very able Florentine painters, brothers, who settled and chiefly resided in Spain, where, agreeably to Spanish orthography, they wrote their name Carducho.

Bartolomeo, the elder, was born in 1560. Vincenzio, the younger, was born in 1568. Bartolomeo was painter, sculptor, and architect, and was the scholar of Federigo Zuccaro, whom both brothers accompanied into Spain, in 1585, where they attained great distinction in the service of the kings Philip II., III., and IV. Bartolomeo was equally excellent in fresco and in oil, and there are still some of his works extant in Spain. He drew in the style of the antique, and with great exactness; he excelled also in composition, in expression, and in colour. There is a Deposition from the Cross by him in a chapel of San Felipe el Real at Madrid, which Cumberland says may well be taken for one of Raphael's. His principal works were the frescoes he painted in the Escurial; he painted also works at Segovia, Valladolid, and Miraflores: and according to Cean Bermudez few Italian artists did so much for the arts in Spain as Bartolomeo Carducho. He died at Madrid in 1608, having served the Philips II. and III. for twenty-three years. The latter, who had appointed him his painter, granted a pension to his widow, and to his two daughters, both of whom were born in Madrid. Vincenzio was the scholar of his brother, and succeeded him as painter to Philip III. in 1609, and his services in the advancement of the arts in Spain were even greater than those of his brother, though in the technicalities of art he was a less able painter. He however educated a numerous school, and in 1633 published a book of dialogues on painting in Spanish, 'Dialogos sobre la Pintura,' &c., which, says Bermudez (1800), is the best work in the Castilian language on the subject. He died in 1636. There are many of his works at Madrid, and some at Valencia, Toledo, Salamanca, and Valladolid, but his greatest work is the series of paintings from the life of Saint Bruno and other saints, in the Carthusian Convent of Paular, commenced in 1626 and finished in 1630.

(Cean Bermudez, *Diccionario Historico*, &c.; Cumberland, *Anecdotes of Eminent Painters in Spain.*)

CA'RDUUS. [THISTLE, P. C.]

CAREW, THOMAS, born in 1589, *of a good family* in Gloucestershire, was educated at Oxford, and attached himself to the court of Charles I., at which he held several [illegible] offices. He died in 1639, leaving a volume of small poems (1640, 8vo.), besides scattered pieces never yet [illegible] collected, and a masque, '*Cœlum Britannicum*,' [illegible] Carew's poems are light and airy *effusions*, [illegible] and all dealing with *topics of a trifling* [illegible] but their merit in their own kind is great. Thomas [illegible] nounces him to be pre-eminently beautiful among poets of his class; and Mr. Hallam hesitates in determining the preference between him and Waller, to whom he holds Carew superior both in fancy and in tenderness, though inferior in judgment and in care of execution. Two of the best poems in his volume appear also among the pieces of Herrick.

CAREY, HENRY, was said to be an illegitimate son of George Saville, marquis of Halifax. He was professionally a musician in London, but attained no great success in his art; although he composed both the words and the music of several songs. One of these was the popular song of ‘Sally in our Alley.’ He wrote several farces and musical pieces for the stage; among which were ‘Chrononhotonthologos,’ 1734, and ‘The Dragon of Wantley,’ 1737. His pecuniary affairs were repeatedly much embarrassed; and, in a fit of despondency, owing perhaps to this cause, he put an end to his own existence, in 1743.

CAREX, a genus of plants belonging to the natural order Cyperaceæ, and to the tribe Cariceæ. The flowers are diclinous, arranged in imbricated spikes, each covered by a glume; the female flowers have a single urceolate persistent perigone, in which the nut is completely inclosed; one style with two or three stigmas; the male flowers have three stamens without a perianth. The species for the most part are inconspicuous and unattractive plants. They are however exceedingly numerous. Lindley, in Loudon's ‘Encyclopædia of Plants,’ describes one hundred and five species, and this is probably not more than half that are now known. Babington describes sixty-six species as natives of Great Britain, being the largest number of species of any genus of phænogamous plants in this country. Koch, in the ‘Flora Germanica,’ describes one hundred and three species as natives of Germany and Switzerland. Although so numerous, they serve directly few of the purposes of man or the higher animals. Their leaves are tough and hard, so that none of them are eaten by cattle except in cases of great necessity. They are for the most part inhabitants of wet and swampy grounds, in bogs, fens, and marshes, in the temperate and northern parts of the world. In the hop-grounds of Great Britain the leaves of some of the species are used for tying the bines of the hops to the poles. In Italy they are used for placing between the staves of wine-casks, are woven over Florence flasks, and occasionally employed for making chair-bottoms. The leaves of the *Carex sylvatica*, according to Linnæus, are combed and dressed, and used as a warm lining for gloves and shoes; and thus protected, the Laplanders seldom suffer from being frost-bitten.

C. arenaria has a place in some of the continental Pharmacopœias; its root-stock being a reputed diaphoretic and diuretic. It is used under the name of German Sarsaparilla, and is employed in cases of skin-disease, as well as in secondary syphilis.

The *C. hirta* and *C. disticha* are often substituted fraudulently or by mistake for it, but do not, according to Bischoff, possess such active properties. It is not known to the practitioners in medicine of this country.

C. arenaria grows on the sands of the sea-shore, and is one of the plants which, in conjunction with the Elymus and Arundo, binds the loose sands, and forms them into solid embankments. Although most of the species are devoid of striking beauty, some of them when in flower are much admired on account of the elegant drooping of their panicles of golden-coloured flowers. This is the case with *C. remota* and *C. Fraseri.* Unattractive as the mass of these plants are to the general observer, they have been carefully studied by botanists, and Willdenow, Goodenough, Wahlenberg, Sckuhr, Scopoli, Boott, Babington, and S. Gibson have done much to throw light upon this obscure genus. Their importance in nature however must not be estimated by their appearance, or their utility to man. They frequently form the only vegetation of the swamp, and by their existence and decay they gradually form a soil, on which plants more immediately useful to man may be grown.

CARLI, or CARLEE. [POONAH, P. C.]

CARLI'NA. [THISTLE, P. C.]

CARLISLE, SIR ANTHONY, surgeon, was born near Durham, in the year 1768. He commenced his professional education with an uncle at York, and from thence he was transferred to Durham, where he remained for some time under the instruction of Mr. Green, the founder of the hospital in that city. Having finished his preparatory studies he repaired to London, and attended the lectures of the Hunters, Dr. Baillie, and Mr. Cruikshank. He was at the same time
Watson, then surgeon to the Westminster Hos-
of Mr. Watson, in 1793, Mr. Carlisle was
appointed his successor. He became a member of th
of Surgeons, and was early appointed one of the c
that body. He was for many years on the Boar
aminers, and one of the curators of the Hunterian
He also held the appointment of Professor of Su
Anatomy, and in 1829 he filled the office of Presid
was appointed Surgeon Extraordinary to George I
he was Prince Regent, and was knighted by hi
first levee he held as king. He was also surge
late Duke of Gloucester, to whom he was introduc
learned Dr. Samuel Parr. In 1808, on the deat
Sheldon, he was appointed Professor of Anatomy to
Academy, an office he held for sixteen years.

Sir Anthony Carlisle owed his position to the a
industry with which he pursued the various depar
science connected with his profession. His early
ance with John Hunter gave him a taste for co
anatomy, which he pursued with much ardour, and
his earlier literary productions were on this subject.
his first papers was ‘A Case of an unusual Form
part of the Brain,’ which was printed in the Trans
a Society for the Improvement of Medical and Surgic
ledge in 1793. To the second volume of the Trans
the Linnæan Society, published in 1794, he con
paper entitled ‘Observations upon the Structure and
of those Intestinal Worms called Tæniæ.’ He supp
Entozoa fed on chyle, and that their organization wa
to their food. In 1800 he was admitted a Fellow of
Society, and contributed a paper to the Philosophical
tions of that year, entitled ‘An Account of a peculiar
ment in the Arteries distributed on the Muscles of
ing Animals.’ This paper was the result of dissecti
Lemur Tardigradus and Bradypus Didactylus, in
author pointed out the peculiar distribution of the
these animals. He conceived that the division an
mosing of the arteries tended to retard the veloci
blood, and thus to secure a greater supply to the
these animals, which living upon trees and only movi
required that their muscular system should be com
action. There are several other anatomical and phy
papers by him in the Philosophical Transactions:
count of a monstrous Lamb,’ 1801; ‘The Physiolo
Stapes,’ 1805; ‘Account of a Family having hand
with supernumerary fingers and toes,’ 1814. After
on the distribution of the blood-vessels in the slo
animals, his attention was directed to the connectio
the circulation of the blood and the action of the mu
in 1804 he gave the Croonian lecture on ‘Muscular
In this lecture he pointed out the difficulties w
invested the subject, and which may have been the
drawing the attention of others to the subject, who
up the inquiry with more success.

To medical literature more especially Sir Anth
many contributions. One of the first was ‘On the
Corns and the mode of removing them,’ published
mons's ‘Medical Facts and Observations,’ 1797;
Method of applying the Tourniquet,’ Lond. Med. a
Journal, 1797; ‘On the general and indiscrimina
Bougies,’ Ibid. 1800; ‘Letter to Sir Gilbert Blan
ters, Rubefacients, and Escharotics, giving an accou
employment of an instrument adapted to transmit
degree of heat to effect those several purposes,’ Lond
In 1817 he published a larger work entitled ‘Ess
Disorders of Old Age and the means of prolongin
Life,’ 4to. London. A second edition was publishe
in 1818. This work is principally devoted to the
of the aged. There is also a good chapter on the
the propriety of performing certain surgical ope
aged persons. It is probable that amongst old peo
question were examined statistically, the knife kills m
than the diseases it is intended to remove. In 182
thony published ‘an alleged discovery of the use of t
and thyroid gland,’ being a paper read at one of th
meetings of the College of Physicians. The autho
was to demonstrate the connexions and the physic
produced by these organs upon more important c
parts, and thus to offer an explanation of their
offices. That he failed to perform this, the still un
functions of these organs proves.

During his connection with the College of Su
delivered two of the Hunterian orations: one in
one in 1826. The first was on the constitution of
bodies, and the second on the connection between va

a-vascular parts. There are some preparations illustra- of the union of these parts in the Hunterian Museum ared and presented by Sir Anthony Carlisle. One of ast papers on medical subjects was published in the 'Lon- Medical Gazette' in 1828, 'On Erysipelas,' in which he rds this disease as 'a humoral and constitutional inflam- on, occasioned by alimentary crudities, because certain table acids and acidifiable viands are often the notorious cedents of the disease.' It was manifest from this and r papers that he was not keeping up with the knowledge s day.

e published numerous other papers: two on plants, in the orticultural Transactions,' two on antiquities, in the chaeologia;' on the breeding of eels, and the health of men in sewers, in the 'Philosophical Magazine;' on decomposition of Eggs, in 'Nicholson's Journal;' and Cathartics, the bite of vipers, the venereal disease, &c., he 'New Medical and Physical Journal.' One of the t remarkable of his papers on general subjects was one on lvanic Electricity,' in 'Nicholson's Journal,' in which he pointed out the fact that water might be decomposed by galvanic battery. He was also a frequent contributor to newspapers, and letters of his appeared in the 'Times' on Salt-Duties, the importance of Salt to the Health of man Beings, Military Flogging, Hygeian Quackery, &c. ongst other subjects on which he wrote with great vehe- ice was that of man-midwifery, and in the 'Times' of ruary 26, 1829, is a letter addressed to Mr. Robert Peel that subject, earnestly entreating him, for the sake of pro- ety, not to degrade the College of Surgeons by making wifery a part of the requirements of a surgeon.

reat progress was made in this country in surgical science the beginning of this century, and Sir Anthony early in was always anxious to improve, and surgery is indebted to for many minor improvements in instruments, &c. 'He t,' says Mr. Pettigrew, 'substituted the thin-bladed ght-edged amputating knife, approaching in its kind to ordinary carving-knife, for the clumsy crooked knife of ner days; and also was the first to employ the carpenter's , simple in its construction compared with that formerly ployed. He was the first to use the *bistouri caché* in country, and he has by the aid of Mr. Stodart introduced improvements in surgical apparatus.'

The talents of Sir Anthony Carlisle consisted in his ob- ing power. His contributions to science are frequently cient in sound generalization. His rapidity of observation his power of application made up for this deficiency, and him a position while he lived which his works will hardly for him now that he is dead. He died in London, on d of November, 1840.

(Pettigrew, *Medical Portrait Gallery*; *Lancet*; *London cal Gazette.*)

CARPENTER, DR. LANT, was born September 2, , at Kidderminster, and was descended both on the r's and mother's side from old non-conformist families in town. In consequence of his father's failure in business, was at an early age adopted by a Mr. Pearsall, a relation of mother, a man of piety and benevolence. To his care instruction young Carpenter was much indebted, and le a boy in Mr. Pearsall's family he began to display that denying benevolence and that interest in education which cterised him through life. Mr. Pearsall had established day-school at Kidderminster, about the time that Mr. commenced his Sunday-school at Gloucester, and knowing of Raikes's efforts. Young Carpenter, then years of age, who taught in his school, was anxious to the boys of his class some additional instruction in and arithmetic, and other branches of useful know- , during the week. As they went to their work at five morning, he was called by them at four o'clock to give their lesson before the commencement of their daily r. This he continued through the year, the lesson in mer being given under a mulberry-tree, and in winter in ll summer-house without fire.

is school-education was received partly under the Rev. ert Gentleman, minister of the congregation to which Pearsall belonged; partly under the Rev. W. Blake, conducted a school at Kidderminster, which Mr. Pear- had founded and endowed for the better instruction of of dissenters of the middle class; and partly under ncle, the Rev. B. Carpenter of Stourbridge. Being gned for the ministry, he was sent (A.D. 1797) at the of seventeen to the academy at Northampton, which had been established by Dr. Doddridge, and which still exists in London under the designation of Coward College. But about a year after Lant Carpenter entered it, the establishment was for a time broken up, the trustees being dissatisfied with its condition, and especially with the real or supposed heterodoxy of the students. Lant Carpenter's friends were probably for the most part Arians: his own views appear to have been still more remote from the standard of reputed orthodoxy. The students had however their exhibitions continued to them for the full term, and Lant Carpenter finished his academical career at the university of Glasgow, though he was obliged to leave (A.D. 1801) too soon to take a degree, but furnished with the most gratifying testimonials from the professors under whom he had studied.

On leaving college he was engaged for a time as assistant in the school of the late Rev. J. Corrie at Birmingham, and was afterwards one of the librarians of the Athenæum at Liverpool, where he became acquainted with Mr. Roscoe, Dr. Currie, and other literary men. While here, he received overtures from several congregations to become their minister, and was offered a tutorship in Manchester College, York, the principal academical institution of the Unitarians. He declined these, but accepted an invitation to succeed the Rev. T. Kenrick as one of the ministers of the Unitarian congregation at Exeter, to which place he removed in 1805. About this time he married. He remained at Exeter twelve years, fulfilling the duties of his sacred office with exemplary diligence, and especially devoting himself to the instruction of the young people of the congregation. He had also a small boarding-school. In 1806 he applied for the degree of M.A. to the university of Glasgow, and the senate sent him instead the degree of LL.D.

While at Exeter Dr. Carpenter was engaged in controversy with some of the clergy of the town and with other persons, but however unpopular his opinions might be, he was held personally in the highest regard. In 1808 he proposed the establishment of a public library at Exeter, took the lead in carrying the proposal into effect, and managed the institution for the first year. This library still exists. He also aided in the establishment of a Lancasterian school and of a savings'-bank in the town, and incited his congregation to establish a Sunday-school. He occasionally took part in public affairs when questions of religious liberty were concerned; and in 1813 moved the adjournment of a meeting held to oppose the Roman Catholic claims; and failing in this, got up a counter petition in support of those claims.

In 1817 he removed to Bristol, as one of the ministers of the Unitarian congregation there. Here his labours in the discharge of his ministerial duties were continued; and his own school was much enlarged. He also interested himself in objects of general utility, and took an active part in organizing the Bristol Literary and Philosophical Institution. Among his coadjutors in this work were the Rev. W. D. Conybeare, Mr. (now Sir) H. T. Delabeche, and Dr. J. C. Prichard. He did not take part in the establishment of the Bristol College, as he was given to understand that his religious sentiments would render his co-operation injurious rather than otherwise. In his own congregation he succeeded, amid some discouragements, in the establishment of a Sunday-school, and continued his exertions for the instruction of the young people of his congregation.

These various exertions, combined with the preparation of his numerous publications, were too much for his strength. He had been laid by through illness for a year in 1807, and would have resigned his ministry at Exeter, but for the affection of his congregation. In the summer of 1826 he was again laid aside: both body and mind had been overwrought, and a long and painful season of weakness and depression ensued. He resigned his pastorship at Bristol and spent some time in travelling in England and on the Continent; by which his health and spirits were gradually restored. At the beginning of 1829 he resumed, by invitation, his ministry at Bristol, the congregation having abstained from appointing a successor, in hope of his recovery; but his school, which had been for a time carried on for him, was given up. In 1839 his health, which had been for some time declining, once more gave way, and in June a painful depression of health and spirits came on. He was again recommended to travel, and while going in a steam-boat from Naples to Leghorn, fell overboard unperceived and was drowned, in the night of the 5th April, 1840. His body was afterwards found on the coast of the Papal territory near Porto d'Anzo, the antient Antium, and was interred on the sea-shore.

Dr. Carpenter was an industrious and useful writer. His publications, including those which were posthumous, amounted to forty-four. Many of these were polemical or other sermons or pamphlets which do not require notice here. The following are his more important works:—1, 'An Introduction to the Geography of the New Testament,' 12mo., 1805: this work has gone through six editions. 2, 'Unitarianism the Doctrine of the Gospel,' 12mo., 1809: this has gone through three editions. 3, 'An Examination of the Charges made against Unitarianism, &c. by Dr. Magee, in his Discourses on Atonement,' &c., 8vo., 1820. 4, 'Principles of Education, Intellectual, Moral, and Physical,' 8vo., 1820: this work is a reprint of articles which he had contributed to Rees's 'Cyclopædia.' 5, 'A Harmony or Synoptical Arrangement of the Gospels,' with dissertations, notes, and tables, and illustrated by a map and plans, 8vo., 1835: a second edition, under the title of 'An Apostolical Harmony of the Gospels,' was published in 1838. It is probably on this valuable work that Dr. Carpenter's reputation as a divine and an author will ultimately rest. 6, 'Sermons on Practical Subjects,' 8vo., 1840: this posthumous volume was edited by his son, Dr. W. B. Carpenter, a gentleman well known as a physiologist and natural philosopher. A deeply interesting memoir of Dr. Carpenter, by his second son, the Rev. Russell Lant Carpenter of Bridgewater, forms a companion volume to the Sermons, and has furnished the materials of the present article. 7, 'Lectures on the Scripture Doctrine of Atonement,' 12mo., 1843; also posthumous, edited by his third son, the Rev. P. P. Carpenter of Stand near Manchester. Besides his separate publications he contributed the chapters on Grammar, Mental and Moral Philosophy, and Antient Geography, to a work called 'Systematic Education,' 2 vols. 8vo., 1815; his coadjutors in which were Dr. Shepherd of Gatacre near Liverpool, and the late Rev. J. Joyce. This work has gone through three editions. He contributed the articles on Grammar, and Mental and Moral Philosophy, to Nicholson's 'Cyclopædia;' on Education, on Language, and on Philosophy, Mental and Moral, to Rees's 'Cyclopædia;' and several papers to Aikin's 'Annual Review.' He was also a frequent contributor to the periodicals of his own religious denomination. He edited two selections of hymns and some other works.

Few men have been more deservedly esteemed than Dr. Carpenter. Even the strongest opponents of the theological system with which he was identified softened their tone when speaking of this good man. As an instance of this it may be mentioned that his 'Harmony' and 'Practical Sermons' and the Memoir of his Life were favourably and largely reviewed in the 'Eclectic Review.' Men of all opinions testified their cordial respect for him. In his own denomination his extensive influence was derived perhaps more from the reverence felt for his piety and goodness, than from his varied attainments and his literary eminence; and among his family and friends, and even among those who had, like the writer of the present notice, but few opportunities of personal intercourse, his memory will ever be cherished as something peculiarly dear and sacred.

CARPENTRY is defined by Robison as 'the art of framing timber for the purposes of architecture, machinery, and in general for all considerable structures.' Considered as a branch of the art of building, it embraces the construction of the framing of partitions, floors, and roofs; the neater woodwork of doors, window-frames, the planking of floors, skirtings, and stairs, being the work of the joiner. [JOINERY, P. C. S.]

As in the article BUILDING, P. C. S., our object here is rather to point out and connect various articles in other parts of the work than to present even a complete outline of the theory and practice of carpentry, which involves a knowledge of the nature and properties of various descriptions of timber, of the strength of materials exposed to various kinds of strain, of the mechanical principles involved in the construction of trusses, roofs, and the various framings which tend to bind the several parts of a building together, or to sustain and distribute pressure, and of the practical details relating to the cutting up of timber, and the union of several pieces by various kinds of joints and connections.

Of the properties of timber an account is given under WOOD, P.C., p. 518, and also, in connection with other matters relating to theoretical carpentry, under MATERIALS, STRENGTH OF, P. C., p. 8. Of the woods used in carpentry in this country oak is one of the most durable, though its comparatively high *and the difficulty* of working it, restrict its use. It should be borne in mind however, that the irregular direction of the fibres of oak greatly impairs its strength when sawn into beams and planks, so that a sawn beam of oak may be weaker than one of equal size of fir, because in the latter the fibres extend in almost perfectly straight lines from end to end, while in the former their course is so tortuous that those which come near the surface are frequently cut through by the saw. Hence arises the superiority, for some purposes, of split over sawn timber, to which allusion is made under SAW, P. C., p. 476. Fir, which is very easy to work, and is peculiarly advantageous for house carpentry, on account of its straightness, is the timber most extensively used by English carpenters. The supply is chiefly from foreign countries, and the principal forms in which it is brought are those of *baulks*, or large beams of various sizes, each of which consists of a whole trunk roughly squared; *deals* and *deal-ends* [DEALS, P. C., p. 338], which are boards from 2½ to 4 inches thick, and more than 7 inches wide; and *battens* and *batten-ends* [BATTENS, P. C., p. 41], which are similar to deals, but only 7 inches wide. Various technical terms are applied to the smaller pieces of timber cut out of baulks, deals, and battens, the transverse dimensions of which are frequently called their scantling. [SCANTLING, P. C., p. 10.] *Stuff* is a general name given by carpenters to the wood upon which they operate. By the drying-up and evaporation of its vegetable juices, timber will continue to shrink for a considerable time after it is hewn, and in so doing it frequently warps or winds, and splits, or becomes shaky, or full of longitudinal cracks, which, as noticed under SAW-MILL, P. C., p. 481, are usually in a radiating direction as regards the centre or heart of the tree. The shrinkage alluded to is almost entirely in a lateral direction, the length of a piece of timber, in the direction of its fibres, being affected only in the most trifling degree. To prevent as far as possible the injurious effects of shrinking, warping, and flying or cracking, all timber should be well seasoned by long exposure to a current of air before it is used, an object which is effected by various modes of stacking and piling with interstitial openings for the admission of air; but as no ordinary means of seasoning will perfectly accomplish the desired object, precautions should be adopted to lessen the evil of subsequent shrinkage. Where it is required to bend timbers they are softened by boiling or steaming, then brought to the required shape, and secured at the proper curvature until they become cold and dry, when they will retain their new form with very little variation. For the various modes of cutting timber see the articles SAW and SAW-MILL, already referred to, and WOOD-CUTTING MACHINERY, P. C., p. 521; and for a notice of the principal boring tools used by the carpenter, see BORING-INSTRUMENTS, P. C. S., p. 225.

Of the employment of timber in immediate connection with brickwork, as in bond-timbers, wall-plates, camber-beams over doorways and windows, &c., a notice will be found under BUILDING, P. C. S., p. 248; and in the articles ROOF, P. C., p. 142, and FLOOR, P. C. S., will be found most of the information required in a work of this character on carpentry as connected with building. In ROOF especially, and in the account of centering under SCAFFOLDING, P. C., p. 458, an explanation is given of those elementary principles of trussing or combining several pieces of timber into a rigid framework in which the strength of each is used to the greatest advantage, which must be applied, with such modifications as circumstances may dictate, to almost every construction in carpentry; while under TRUSSING, P. C., p. 318, the application of the same principles to the support of large beams or girders is explained. The construction of timber partition-walls, or rather of the timber framing of such partition-walls as are covered with lath and plaster, though based on the same general principles as are involved in the trusses of a roof, may be noticed here, because, though a distinct branch of carpentry, it does not, like the construction of floors, demand a separate article.

Partitions formed of brick-nogging, or of brickwork included within the intermediate spaces of a timber framing, are noticed under BUILDING, and as, from their weight, th inapplicable excepting in cases where there is a soli ing or foundation for the whole length of the partiti in basement partitions, or in such partitions of upper as are immediately over partition-walls rising from the ment, they call for but little skill in the arrangement o timbers. For such, and for lath and plaster, or, as th called (from the use of small timbers denominated qua in their construction), *quarter partitions*, wherever th upon a solid basis, it is sufficient to fill the rectangular framin h bounds the partition at the sides, top, and bottom with ies of upright rectangular bars, the greatest width or ness of which is disposed in a direction at right angles the face of the partition. These upright timbers, or erings, are placed at uniform distances from each other, intervening spaces being, in a brick-nogging partition, r 18 or 27 inches, so as to receive either two or three s in length, while in other cases they are usually less; he depth of the quarterings, which regulates the thickness e partition, is usually from 3 to 5 inches. Those for bricking, where the surface is to be covered with lath and er, should somewhat exceed the thickness of the brick- , so as to allow for irregularities in the form of the . When however the floor upon which the partition is not solid, but unsupported in the centre, the whole should be borne by the extremities of the lower edge e partition, which should be constructed as nearly as ble like the trusses of a roof, and should be capable of ling support to the floor above it, and also, if needful, to below it, on which it appears to rest. The simplest mode ccomplishing this is to insert in the frame two inclined , resembling rafters, abutting upon the lower corners of partition, which of course must be firmly supported by imbers of the floor at the point where they rest upon the -plates or are otherwise immoveably connected with the work, and either meeting in the centre of the top of the ition, like the rafters in Roof, *Fig*. 9, or being *joggled* into head of a central upright timber resembling the king-post oor, *Fig*. 10, which, like it, may be made to support the lle portion of the bottom of the partition, and, if needful, floor beneath it also. In either case the point of meeting mes a fixed point for supporting the ceiling or floor above If the length of the partition be too great for this arrange- it, or if a doorway be required where the central post would e, two posts may be used instead of one, with an hori- al bar of wood between their upper ends, the two uprights resembling the queen-posts *i i*, and the horizontal bar the r-beam *h*, in the truss represented in Roof, *Fig*. 11. The onal bars are called *braces*, and the horizontal piece between posts is sometimes called an *intertie*, but the names are ob- onable because their action is the reverse of that of a tie, or hat would be generally understood by a brace. Doorways derange the bracing of partitions, and sometimes render possible to retain the advantage of the tie afforded by the piece of the rectangular frame which bounds the par- . In some cases the intertie, or rather collar-beam, the head of the doorway; but as the doorway is mostly lower than the partition, it is not unusual to extend the ntal piece which forms the head of the doorway the length of the partition, and to form the long rectangular above it, and the rectangular spaces below it on each of the doorway, or the whole space below it, including orway, into separate trusses. The long unbroken truss the doorway may indeed be made to support the whole without the aid of bracing in the lower compartments. times, instead of the ordinary mode of bracing, which rily interferes with the fixing of the upright quarter- to which the laths are to be attached, a mode of bracing parabolic arches of iron or wood, as illustrated in Roof, 18, is adopted. The usual mode of bracing is occasion- used for brick-nogging partitions, or, in rural cottages, for brick-nogging of external walls; but of course its adoption much trouble in cutting the bricks to fit the oblique and angles produced by the braces.

Respecting the various kinds of joints required in carpenter's s some remarks are made near the end of the article ; while Scarfing [P. C., p. 13], or the mode of joining longitudinally, is the subject of a separate article. mentions an ingenious modification of the common -and-tenon joint which is worthy of notice, under the e of *fox-tail wedging*. It consists in the insertion in the of the tenon of a thin wedge, which, when the mortise is not through, but simply into, the piece of wood in which it is ed, is forced into the tenon, and consequently imparts to what of the dovetail form, by the mere act of driving tenon into its place. Robison suggests that, to guard st the liability of the tenon to split beyond the shoulder, required effect may be better produced by the use of l very thin wedges, which will collectively enlarge the of the tenon in the necessary degree, than by the employ- of a single wedge of greater thickness. This mode of ging is much employed by ship-carpenters in securing -nails, which are the large pegs of wood used in certain cases in lieu of metal fastenings. The subject of naval carpentry is treated under Ship-Building, P. C., p. 393.

The series of articles written by Professor Robison for the 'Encyclopædia Britannica' on the science of carpentry, and republished, with notes, in his 'System of Mechanical Philosophy,' form perhaps the most valuable body of information on the subject; though the numerous practical works of Nicholson, by whom the treatise on carpentry in the 'Encyclopædia Metropolitana' was supplied, and Tredgold's 'Elementary Principles of Carpentry,' go much more into details. The nature of the last-mentioned work is noticed under Tredgold, P. C., p. 180.

CARPI, UGO DA, a celebrated old Italian wood engraver, who lived in the early part of the sixteenth century, and has the credit in Italy of having been the inventor of printing in light and shade with wooden blocks. Scarcely a circumstance of his life is known beyond the above, and that his father was Count Astolfo di Canicho. From his name it would appear that he was born at Carpi, but even this is disputed: he seems to have lived chiefly at Modena. He was also a painter, and some authorities make him the scholar of Parmegiano, others the scholar of Raphael. In painting however he did very little; only one of his pictures is recorded, St. Veronica between St. Peter and St. Paul, and that for the following singular inscription upon it:—'Ugo da Carpi ha fatto questa pittura senza pennello; chi non lo crede si becca il cervello' (Ugo da Carpi painted this picture without a brush; who does not believe it, may scratch his head). He painted it with his finger. It is still preserved in the Sacristy of St. Peter's at Rome, and when it was shown to Michelangelo, he coolly remarked, 'It would have been a much better picture, if he had used a brush.'

Heineken and Bartsch describe thirty-one of Ugo's prints, but only some of these have his name to them. It is difficult therefore to identify his cuts, because Andreani and Antonio da Trento engraved in a similar style, and also published many prints without their names. Ugo's prints are very scarce, and nearly all after Raphael and Parmegiano; some of them are very large. They are generally well drawn, and executed with perfect understanding of the light and shade: the earliest date upon them is 1518. Vasari, in the Life of Marcantonio, mentions as among his masterpieces Diogenes and his Tub, after Parmegiano, and Æneas bearing away Anchises, after Raphael. He used generally three blocks; one for the outline, another for the middle tints, in which the high lights were cut out, and the third for the shadows.

(Vasari, *Vite de' Pittori*, &c.; Gandellini, *Notizie Istoriche degli Intagliatori*, &c.; Tiraboschi, *Notizie degli Artefici Modenesi*; Bartsch, *Peintre-Graveur*.)

CARPI'NI, JOHANNES DE PLANO. Early biographers and historians are so silent with regard to this remarkable monk of the thirteenth century, that we can neither discover the time nor the place of his birth. Indeed little is known of him except through his own account of his travels; and this account was probably not all written by himself. The probabilities are, that he was born at a village in the province of Capitanata, in the kingdom of Naples (Piano di Carpino), about A.D. 1210. He became a friar of the order of St. Francis, or of the Minorites—an order which was then recently established, and which was distinguished in its earlier stages by the zealous, enterprising, and fearless spirit of its members. In 1246, when Europe was thrown into consternation by the irruptions of the Mongols, who had ravaged Russia, Poland, Hungary, and other countries, Pope Innocent IV., after holding a grand council of the church at Lyon (1245), resolved to send legates to these formidable conquerors, in order to pacify them, and, if possible, to convert them to the Christian faith. For this purpose six monks or friars were selected from the new and severe orders, namely, two from the Franciscan order and four from the Dominican order. Johannes de Plano Carpini (as his name is latinized) appears to have been the first chosen by the pope, on account of his abilities and courage; and his companion, a monk of his own order, was one Benedict, a Polander, whose knowledge of some of the north-eastern countries of Europe was very useful. These two friars were instructed to take their route through Bohemia, Poland, and Russia, and then by the north of the Caspian Sea. The other four friars, Asceline, and Alexander, Albert and Simon de St. Quintin, were ordered to proceed through Syria, Persia, and Khorassan by the south of the Caspian Sea. The most fearful accounts prevailed of the ferocity and indomitable courage of these Asiatic invaders. A letter had been recently circulated, written by one Yvo of Narbona or Narbonne to the Archbishop of Bordeaux, containing the confession of an Englishman (who had lived among them), touching the barbarous demeanour of these Tartars. The Englishman, according to his confession, or according to this letter, had been perpetually banished out of the realm of England for certain notorious crimes, and had betaken himself to the Holy Land. Not long after his banishment, being at Acon (Acre, or St. Jéan d'Acre), and thirty years old, he there lost all his money at dice. Then, having nothing but a shirt of sackcloth, a pair of shoes, and a hair-cap, and being shaven like a fool, he set out on his travels through Syria and Asia Minor; and, to prosper the better, he feigned idiotcy and dumbness, for idiots have been at all times objects of superstitious reverence with the Turks; and the pretence of being dumb aided in concealing the fact that he was a Ghiaour or Christian. After long wandering, he fell among the Mongol Tartars, learned their language, and went with them when they began to march upon Europe. The horde which he followed was defeated and driven back by a mighty army collected by the duke of Austria, the duke of Bohemia, the patriarch of Aquileia, and others, including the prince of Dalmatia, who took eight prisoners, and among them this strange Englishman. The letter describes our countryman as being 'somewhat learned,' and as having been employed as interpreter and ambassador by the Tartars in their communications with the Christian princes. The account the fellow gave to his captors was flimsy and very short, and full of horror and exaggeration. Matthew Paris records this famous letter under the date of the year 1243.

But the intrepid monks of the two new orders were not deterred by any prospect of danger. 'And although,' says the introductory epistle to the travels of Carpini and his comrade friar Benedict, 'we personally dreaded from these Tartars and other nations that we might be slain or reduced to perpetual slavery, or should suffer hunger and thirst, the extremes of heat and cold, reproach, and excessive fatigue beyond our strength (all of which, except death and captivity, we have endured, even beyond our first fears); yet did we not spare ourselves, in order that we might obey the will of God, according to the orders of our lord the pope, and that we might be useful in some things to the Christians, or at least, that the will and intention of these people might be assuredly known and made manifest to Christendom, lest suddenly invading us, they should find us unprepared, and so make incredible slaughter of the Christian people.' In Poland and Russia, and wherever the widely spread Sclavonian language was spoken, Friar Benedict the Pole served the Italian as interpreter. The two monks ran great danger of being murdered by the people of Lithuania, who appear to have been at this time many degrees less civilized than the Mongols. In Russia they were upon the whole hospitably and kindly entertained. As the Russians adhered to the Greek or Eastern church, Carpini in a public meeting exhorted the grand duke and his bishops to abandon their heresy, and boldly read to them the letters of Pope Innocent, wherein they were admonished to return into the unity of the Roman Catholic church. Although our Franciscan effected no conversion, he raised no animosity by this boldness. He and his companion Benedict received good advice as to the best means of dealing with the Tartars, and were sent forward to Kiow, then the chief city of Russia, and not very far from the uncertain moveable frontier of the Mongols. At Kiow they hired an interpreter; but they afterwards found reason to lament that this man was unequal to the duties he had undertaken to perform. The Mongols at this time occupied all the country between China, Siberia, and the Caspian Sea, the van of this nomadic pastoral army being on the river Dnieper, and its rear under the great wall of China. The subordinate khans or chiefs passed the two monks onward from post to post until they came to the head-quarters of the great Baatu. These posts were far apart. The country where Baatu had his camp (called by the travellers Comania) was far beyond the Caspian Sea. But their toils were not yet over: Baatu ordered them to proceed to the court of his sovereign, the Khan of khans and Emperor of all men. They then entered a country called by them 'the country of the pagan Naymani,' where they travelled for many days, till they came to the proper lands of the Mongols. Through this country they journeyed for about three weeks, continu- with great expedition. 'In the whole of this onks, 'we used extraordinary exertion, as commanded to bring us on with all
expedition: on which account we always travelled
morning till night, without stopping to take foo
often came to our quarters so late, as not to get any
night, but were forced to eat in the morning what
to have had for supper. We changed horses freque
day, and travelled constantly as hard as our horses
It is not easy to name the places or even to trace
which they followed; but they appear to have pas
head of the Baikal lake, and to have traversed gr
the country vaguely denominated Chinese Tartary,
the direction of the 'Everlasting Wall,' or the gr
China. In all the vast regions occupied by the Mo
their flocks and herds there was not one fixed town,
scarcely a house; for the people of all degrees,
their khans and the very emperor himself, lived co
tents, and moved from place to place as pasturage,
other business required. Wherever the great chi
the assemblage of tents and the camp had a name,
monks set down; but in all probability, within a s
after their passage, these tents were all struck and
to a distant quarter, and the populous spot was left
in the vast surrounding wilderness. They must ha
the Emperor or Great Khan somewhere to the no
sandy desert which spreads itself between the Great
Tartary, as there is no mention made of their tra
camels, or of their entering upon that desert. He
not attempt to name the place, merely calling it th
the Emperor. This great potentate, whom they
or Cuyne Khan, had many spacious tents, one be
that it could have contained 2000 men. Princes
lords from China, a duke from Russia, two sons o
of Georgia, and an envoy of the caliph of Bag
waiting submissively upon the Mongol conqueror.
circumstances, scarcely intelligible letters and an a
message from the pope delivered by two poor b
friars were not likely to make much impression upo
shepherd-warrior. While the friars stayed about
tent, a warlike ceremony was performed, which
preted into a defiance against the Church of Rome, t
empire, and all the Christian kingdoms and natio
West; and they were otherwise informed that i
intention of these Mongols to subdue all the kingdo
earth as Zinghis (Genghis) Khan had commanded th
The Lord of the World however admitted th
audience, received from them the letters of the
gave them in return letters for his Holiness writ
Mongol language and also in Arabic. The monks
that during their stay there, which continued a who
they were in such extreme distress for victuals and
they could hardly keep themselves alive; adding
must verily have perished at last if God had not se
aid a Russian goldsmith, who was in favour with the
and who procured them some food. At last, on th
St. Brice (the 13th of November, 1247), they rece
mission to depart from this inhospitable court. They
by the same route, travelling the whole winter thr
desert, and often sleeping at night on the snow. O
of June, 1248, they reached Kiow, where their
friends joyfully received them. In all they ha
sixteen months entirely among the Mongols and t
that had been conquered by them. Pope Innocent
joined them to be diligent and accurate in their obs
and faithful in reporting what they saw and heard
strange people who had made all Europe trembl
friars acted up to these instructions, and, allowan
made for the state of geography and other sciences
the condition and superstitions of the time, the accou
Carpini or his friends gave to the world was an
little book of travels, the accuracy of which has b
firmed by John Bell of Antermony [Bell, John, P.
other and later travellers through the vast regio
intervene between European Russia and China.
was the first to uproot a set of monstrous fables, an
a true and striking picture of the peculiar civilizati
Tartars. But at the same time he revealed their
warlike strength, and close political union; and w
disunited and distracted kingdoms of Christendom th
hordes moved westward they would be found irresis
less a league of Christian princes were previously f
the single purpose of opposing them. The chapte
'How the Tartars are to be resisted,' is full of good

It appears that Friar John returned to Italy, and t
with some assistants, he published his plain un

his travels in a 'Libellus,' or small book, in Latin. ok or manuscript (of which no doubt there were copies) we have never been able to obtain a sight. be known solely through the 'Speculum Histo- incentius Belvacensis, where it is inserted at full gether with some information about their journey, author or editor, Vincentius, says he received from St. Quintin, one of the four friars who had gone by of the Caspian, and whose information was very pared with that of Carpini. From the 'Speculum Ramusio transferred all this matter, together with ranslation to follow the Latin text, into the second his 'Raccolta di Navigazioni e Viaggi,' which was Giunti at Venice, in the year 1556. From this work of Ramusio, our own good compiler, Richard opied the matter into the first volume of his 'Navi- l Discoveries,' which was published in London close of Queen Elizabeth's reign, in the year 1599. ho of course only transfers the Latin text, gives a g translation of his own; but he omits several hich are given by Ramusio. One instance may s, and at the same time throw a light upon the e suppression. There is a section or short chapter about the heroism of the Franciscan friars in re- nd their knee to some Tartar idol: Hakluyt omits altogether. From Ramusio or from Hakluyt all indeed all existing accounts of Carpini and Friar ve been drawn. Bergeron gave an abridgment of n his 'Voyages faits principalement en Asie dans 14ᵉ et 15ᵉ siècles, par Benjamin de Tudele, Car- quis, &c.,' la Haye, 1729-1755. A somewhat translation of the Latin text of Hakluyt is given in History and Collections of Voyages and Travels,' 1824.

in the 'Biographie Universelle,' who seems deter- sh the good monk's story without having materials mpletion, says that it appears that after his return he devoted his life to the missions in the north preached the gospel in Bohemia, Hungary, Nor- nmark, and died in the midst of these apostolical n advanced age. Neither Ramusio nor Hakluyt g of the sort (they both indeed confine themselves is Mongol mission and travels); and we have n among old Italian biographers and other writers ails. The same French writer says that Carpini to speak of Prester John, that Christian priest e who was so much famed among the travellers e ages, and whose existence and the geographical whose country gave birth to such a variety of opinions. Now, neither in the full text of r in the slightly mutilated text of Hakluyt, does n speak of or even name this Prester John, whose stence had a different and a more ancient ori- ese texts Carpini says that the great khan or ys kept some Christian priests about his person, ll times a Christian chapel, in which the clergy votions publicly, and struck the hours on bells, the custom of the *Greek* Church. But these iests of a schismatic church have little or nothing ith the notion of Prester John, that great but scoverable orthodox Roman Catholic priest- French biographer, although he does not name er and completer Ramusio, names Hakluyt, as geron; but it should appear that he had never tion of Hakluyt's book, which is well worth the rpini divides his general observations and his short, easy, and comprehensive chapters, and no words. Many of his descriptions are truly om their brevity, point, and accuracy. In these e was not exceeded even by Marco Polo.

OHN, a noted English architect in the latter half enth century, was born in 1721, at Horbury, near Yorkshire, at which place he afterwards erected at was founded by himself. His practice was rable in Yorkshire and the adjoining counties, ected several stately mansions, and other build- blic and private. He was twice lord mayor of 0 and 1785; and realized a handsome fortune, have been at the time of his death worth not ,000*l*. He died at his residence, Askam Hall, ebruary 22, 1807, aged eighty-six. Carr belonged -Palladian school, and if he rarely displayed much ever fell into frippery, like Adam, nor did he, like Wyatt, mistake nakedness and tenuity for simplicity. Among his principal works are the Town Hall at Newark, Notts; the Crescent at Buxton; the Bridge at Boroughbridge; Harewood House, Yorkshire, one of his best mansions; Tabley House, and the splendid Mausoleum of the Marquis of Rockingham at Wentworth. This last-mentioned structure, erected in 1788, is 90 feet high, and consists of a square Doric basement, above which is an Ionic order, with a large open arch in each front, through which is seen a sarcophagus in the centre, and the third story is a circular peristyle of the same order, crowned by a dome. Within the basement is a circular chamber covered by a dome, resting on eight Doric columns, and in the centre stands a statue of the Marquis by Nollekens. This mausoleum is shown in plate 61 of Stieglitz's 'Belle Architecture.'

There is a good portrait of Carr in the second volume of Dance's 'Collection of Portraits,' which work also contains those of several other architects of the same period.

CARRAGEEN MOSS. [SEA-WEEDS, P. C.]

CARRA'RA, DA, the name of an historical family of Italy, which held sovereign sway over Padua and the neighbouring provinces during the middle ages. Like most of the north Italian nobility of that period, the Carrara appear to have been of Longobard origin. One of their ancestors, by name Luitolf, is recorded as the founder of the abbey of Carrara, in the territory of Padua, about A.D. 1027, and as having built a castle in the neighbourhood, which had feudal jurisdiction granted to the owner by the Emperor of Germany. Several of Luitolf's descendants filled municipal offices in the community of Padua. Marsilio da Carrara was put to death by Eccelino, tyrant of Padua. After the death of Eccelino, A.D. 1259, Padua was restored to its municipal independence as an important member of the Guelf league, and as such found itself at variance with the Della Scala, Lords of Verona, who were Guibelines. Jacopo da Carrara commanded the troops of Padua against Can della Scala, in the early part of the fourteenth century. The citizens of Padua, being distracted by factions, elected Jacopo for their lord, in 1318. Jacopo died in 1324, and was succeeded by his nephew Marsilio, who being hard pressed by the Della Scala of Verona, was assisted by the republic of Venice in repelling them. He died in 1338, and was succeeded by his nephew Ubertino, who dying in 1345, was succeeded by Marsilietto his relative, who belonged to a distant branch surnamed Carrara Pappafava. After two months Marsilietto was stabbed by Jacopo II., nephew of the first Jacopo. This Jacopo II. was himself murdered by a relative in 1350, and was succeeded by his brother Jacopino, jointly with Francesco his nephew, son of Jacopo II. Francesco da Carrara being at the head of the troops, arrested his uncle in 1355, and confined him in a fortress. He then remained sole lord of Padua. His reign was eventful. He was at the head of the Lombard or Guelf league against the Visconti of Milan. He afterwards entered into a war against Venice, but was obliged to conclude a humiliating peace, and to send his son to Venice to make apology. In 1378 he joined the Genoese in their attack against Venice, by which the republic was brought to the brink of ruin, a consummation which Francesco was determined to effect, but which was prevented by the patriotism of the citizens of Venice, and by the timely arrival of Carlo Zeno with his squadron. In 1381 peace was made. A fresh quarrel of Francesco with Antonio della Scala of Verona, led to an alliance of the former with Gian Galeazzo Visconti, who after taking Verona, turned round against his ally, took Padua and Treviso, arrested Francesco in 1388, and kept him prisoner till his death at Monza in 1393. Francesco da Carrara was intimate with Petrarch, who speaks of him in his works.

Francesco II., called Novello, after his father's imprisonment wandered as an emigrant about Italy and France, begging for assistance to recover his father's territories, and at last he re-entered Padua in 1390. Having made peace with Visconti, he repaired to Venice, where, in presence of the senate, he expressed his gratitude for the assistance which he had received from the republic during his struggle against Visconti, swore perpetual friendship to Venice, and had his name inscribed in the golden book in the roll of the patricians. He however broke his word, and [illegible] territory, and was taken prisoner to Venice, where he was strangled with two of his sons in the dungeons of [illegible] palace, in 1406, according to [illegible] times. Venice took possession of Padua, [illegible] other territories of the Carrara. [Verci. [illegible]

Many years after, the last remaining son of Francesco, named Marsilio, having formed a conspiracy to recover possession of Padua, was seized and put to death in 1435.

(Litta, *Famiglie Celebri Italiane;* Sandi, *Storia Civile di Venezia;* Vergerio, *Vitæ Carrariensium Principum ad ann.* 1355; Verci, Gianbattista, *Notizie Storico-genealogiche de' Signori da Carrara;* Ticozzi, *Viaggi de Messer Francesco Novello da Carrara, Signor di Padova e di Taddea d'Este sua Consorte*, Milan, 1823. This last is a kind of historical novel of the wanderings of Francesco II., after his father's imprisonment.)

CARRAWAY. [Carum Carui, P. C. S.]

CARSTARES, WILLIAM, a Scottish ecclesiastic, more distinguished for his political exertions in furtherance of the Revolution settlement than in connection with his profession, was born at Cathcart, near Glasgow, on the 11th of February, 1649. His father was the Rev. John Carstares, minister of the High Church, Glasgow, who, like his son, but in a less degree and with less diplomatic capacity, took a lively share in the ecclesiastico-political movements of his time; offered a violent opposition to Cromwell's schemes of general toleration, and suffered by the prevalence of his own principles of clerical coercion during the persecutions of the Covenanters under Charles II. (See 'Notices of the Life of the Rev. John Carstares, by the Rev. William Ferrie.') William Carstares acquired the rudiments of his education in a neighbouring village school, and afterwards studied in the University of Edinburgh. Early in life he seems to have resolved to plant the seeds of subsequent distinction by arduous study, and he appears to have become in early life not only an accomplished scholar, but an accurate observer of men. During a great portion of the latter end of the reign of Charles II. he lived in Holland, and studied theology at Utrecht, where he is supposed to have taken orders. Accident introduced him to the notice of the pensionary Fagel, who, finding in the young clergyman great sagacity and self-reliance, and a knowledge of the political institutions of his own country seldom equalled at his early years, recommended him to his master, the Prince of Orange, afterwards William III. It was natural that the prince, whose wife, in the absence of male issue of the Duke of York, was after him next heir to the crown, should have about his person individuals acquainted with the politics of the country of which he might eventually become ruler. In this view he chose young Carstares as one of his confidential advisers, and events justified the selection. The time of his return to Britain is not precisely known. He was in London in 1682, and was more or less connected with the projects on which the prosecutions in connection with the Rye-house and assassination plots were founded. There is much reason to presume that he was the medium of communication between the court of Holland and some of the parties prepared for insurrection. He was, at all events, in the secrets of the Argyle party in Scotland, and the key to a cipher through which Argyle and Monmouth corresponded was found to be in his handwriting. A warrant to apprehend him was issued, and he was found attempting to conceal himself in Kent. Sufficient evidence could not be found to bring him to trial in England, and he sued out a writ of habeas corpus, which was defeated by sending him to Scotland, where the practice of torture still remained a stain on the administration of justice, which Carstares was subsequently a main instrument of removing. In the presence of the Privy Council of Scotland he was subjected to the torture of the 'thumbigen,' or thumb-screw, which he bore with great fortitude, refusing to divulge the secrets he possessed. He was subsequently presented by the Privy Council with one of these cruel instruments, which he bequeathed as an heir-loom to his family; and it is a traditional anecdote that William III., having desired to experience the initial symptoms of this species of torture, the divine turned the screw at his request, but rather too vigorously for his Majesty's nerves. Whether the general supposition be true that Carstares was then acquainted with state secrets, the divulgence of which might have baffled the projects of the Prince of Orange in connection with the British crown, is likely to remain as much a mystery as he left it. That he knew much must have been conjectured by those who spared neither industry nor cruelty to overcome his firmness; but that no clue was obtained to the character of his knowledge is pretty clear from the circumstance of his afterwards being released on a sort of compromise, by which he confessed a knowledge
atters which were otherwise proved in the trial of Baillie
swood. He returned to Holland with all his secrets
d, and was warmly received by the prince, who, in devising the expedition which created the Revoluti
is said to have mainly relied on the full knowledg
parties, and the advice, both bold and sagacious, o
He was subsequently of great service in producin
ciliation between the Scottish Presbyterians and W
who could not precisely understand the perti
which his northern subjects adhered to the princip
tual independence. A General Assembly bein
convene, at which it was understood that there
violent opposition to the oath of allegiance, the k
advice from less sagacious counsellors, had pr
delivered to a messenger dispatches directing the
enforcement of the act. It is said that Carstar
authority to stop the messenger in his Majesty's
presenting himself to the king (who had gone to
middle of the night, in the guise of a petitioner
forfeited by his having thus committed high treas
prevailed on him to dispense with the oath. W
anecdote be true or not in all its circumstances, th
doubt that his influence obtained the dispensation.
now virtually prime minister for Scotland. He r
popular designation of 'Cardinal Carstares;' an
observes, 'It is curious to remark how the haugh
condescended to stoop and truckle to a Presbyter
man, whom their predecessors in office had t
deceived.' Even after the death of William, his
of Scottish affairs, and the respect paid to his talen
with considerable influence. In 1704 he was chose
of the University of Edinburgh. He died on
December, 1715.

(*State Papers and Letters addressed to William*
to which is prefixed the Life of Mr. Carstares, 4t

CA'RTHAMUS TINCTO'RIUS. [Safflow

CARTRIDGE, a cylindrical case containing
gunpowder or shot, or of powder and ball, for fire-a
used for military purposes, to facilitate the loading
carbines, and pistols, are formed of a strong
manufactured for the purpose, called cartridge-
are styled ball or blank cartridges according as t
both powder and ball or powder only; while
cartridges for cannon and mortars, which always
powder only, are usually cased with flannel, though
pasteboard, tin, or even wood is employed.
Americans, during their last war with England,
have employed very thin sheets of lead, resem
used for lining tea-chests, for this purpose. The
of such a substance is, that it obviates the danger
particles of the cartridge-case which remain in the
it is fired, an accident which is liable to occur whe
used, and which may be productive of the most f
sequences.

Wire cartridges, for containing a charge of
without powder, have been introduced for sportin
within the last few years. The author of the artic
ing,' in the new edition of the 'Encyclopædia
states that they were invented in 1828 by Mr. J
that they were not brought to perfection until
years later, owing chiefly to the difficulty of regu
precise time for the dispersion of the shot. Eley'
tridges have been brought, by successive improve
high degree of efficiency, and are made of various
according to the distance at which the charge is
take effect. Wire cartridges consist of an inner ca
network inclosed in a thin paper case, to the ou
which a wadding is attached. The shot, with w
usual to mix bone-dust or some other substance to
interstices, is put within this case, which is ram
upon the charge of powder. When the gun is
paper case is torn to pieces as soon as the cartridge
gun, and the shot immediately begins to quit the ca
passing through the meshes of the wire net-work
carried forward with the charge until it is quite cl
it falls to the ground. By this contrivance the lead
gun is avoided, and the recoil produced by the di
lessened, the charge leaving the barrel like a bul
shot are also carried so much more closely than w
that lighter charges, and consequently a lighter gu
used; much time is saved in loading, especially as n
wadding is required; and, as the cartridge has no
to move before it is impelled by the explosion of th
the danger arising from the accidental shifting o
loose charges is avoided. Greener, in his work enti
Gun; or a Treatise on the various descriptions of

s,' which was published before wire cartridges had been ught to their present state of comparative perfection, sug- ts the use of a case of felt, made much thicker at the tom than at the sides, as a substitute for wire.

n the 'Transactions' of the Society of Arts, vol. xlv. 106, 107, is a description, illustrated by figures, of a hine invented by Mr. Caffin for filling cartridges, in ich two cylindrical cases, each of which will contain the per charge for one cartridge, open at both ends, and ring a little at the lower end, are so mounted that by ving a handle each may be brought alternately under a pper, from which it receives a supply of powder, and over aperture in a plate upon which it moves, through which charge escapes by a conducting channel into the paper e of the cartridge. With one of these machines one boy is e to deliver 12,500 measures of powder in a day, supplying hopper himself.

CARTWRIGHT, WILLIAM, born in 1611, was the n of a person who, after having possessed a good estate, had nk to the station of an innkeeper at Cirencester. He was cated at Westminster and Oxford; and, taking orders, ceived, in 1642, an appointment in the church of Salisbury. the same year he was one of the council of war named by University of Oxford; and, early in 1643, he became nior proctor and reader in metaphysics. He died in that r of a malignant fever, then epidemic in Oxford. Al- ugh Cartwright thus died before having completed his rty-second year, he had attained high reputation both for rning and for genius. Precocity, rather than strength, st have been the quality which gained for him Ben Jon- n's commendation, 'My son Cartwright writes all like a n.' A collected edition of his 'Comedies, Tragi-comedies, d other Poems' appeared in 1647, and again in 1651. The scellaneous poems which the volume contains are much erior in merit to the four plays, one of which, 'The Ordi- ry,' has very justly received a place in the collection first blished by Dodsley.

CARUM (from Caria in Asia Minor, where the plant s originally found), a genus of plants belonging to the tural order Umbelliferæ, to the suborder Orthospermeæ, d to the tribe Ammineæ. It has an obsolete calyx, ob- rdate petals, with a narrow acute inflexed point, oblong uit, carpels with five filiform ridges, interstices with single ttæ, a depressed stylopodium. The species are glabrous rbs with perennial tuberous edible roots, pinnate leaves, and hite flowers.

C. Carui, Common Caraway, has a fusiform root, bipinnate ves, leaflets cut into linear segments, no partial involucre, general involucre absent or of only one leaf. It is a native oughout the whole of Europe in meadows and pastures. is found in Great Britain, but can only be regarded as a turalised plant. The fruit of this plant is known in shops the name of caraway seeds. [CARUM CARUI, P. C. S.] e leaves of this plant are frequently used in spring to put oups, and the roots are boiled and eaten as parsnips, to ich some persons prefer them.

On account of its varied uses this plant is both sown in the rden and in the field. When raised in the garden, a arter of an ounce of seed will serve for a bed four feet by . It should be sown in the autumn, and when the seed- gs have put forth their stems, they should be thinned to out a foot distance each way. In the field the culture of e caraway is conducted in the same manner as that of the riander, and 'in all probability,' says G. Don, 'both plants uld answer if sown like clover among a crop of corn, hoed d thinned when the crop was removed, and again in the llowing spring.' The mode of cultivating the caraway in sex, is to plough some old pasture land, the older the tter, composed of a strong clayey loam soil. 'Twelve unds of caraway-seed are mixed with ten pounds of riander and twelve pounds of teasel-seed; this is sufficient r an acre, and is sown directly after the plough, harrowing e land well. When the plants appear of sufficient strength the hoe, which will not be until about ten weeks after , it must not be omitted, and in the course of the the crop will require three hoeings, besides one at chaelmas. The coriander being annual will be fit to cut he beginning of July. It is left in the field after and thrashed on a cloth in the same manner as rape- About April following the caraway and teasel will nt a good hoeing done deep and well, and another about beginning of June. The caraway will be fit to cut the ginning of July, and must be thrashed in the same manner as the coriander. This compound crop is mostly sown on land so strong as to require being a little exhausted to make it fit for corn. Caraway and coriander are oftenest sown without teasel; the latter being a troublesome and uncertain crop, and the produce of caraway much greater without it. The produce of caraway, on very rich old leys in the hundreds or low lands of Essex, has often been twenty hundred weight to the acre.' (Don.) There is always a demand for the seed, or more properly speaking the fruit, in the London market. Dr. Anderson says that the roots and the herbage may be given to cattle in the spring. Several varieties have been described by botanists. One of these is the American species *C. c. elongatum*, which has the segments of the leaves linear elongated.

C. verticillatum has the general and partial involucres of many leaves, the leaves pinnate, and the leaflets linear. The segments of the leaflets spread in such a way as to appear whorled, hence the trivial name. It is a native of the western parts of Europe. In Great Britain and Ireland it occurs as a rare plant in damp, hilly pastures.

C. Bulbocastanum of Koch, is the *Bunium bulbocastanum* of Linnæus. [BUNIUM, P. C. S.] It is the Scandix and Sium Bulbocastanum of Sprengel and Moench. Babington, in his Manual, has restored the Linnæan species.

(Babington, *Manual of British Botany*; G. Don, *Gardener's Dictionary*.)

CARUM CARUI, COMMON CARAWAYS—*Medical Properties of.* This umbelliferous plant is indigenous in most parts of the south of Europe, where its roots are used in the same way as those of the parsnip and carrot, and its fruits, incorrectly termed seeds, are collected as aromatic stimulants, for a variety of purposes. It is cultivated in England, chiefly in Essex, for the fruit alone; but much of what is used in this country is imported from Germany, where it is in extensive use to form a liqueur. The fruit is too familiarly known to require description; but to secure it in perfection it must be ripe, brown, not green, and when rubbed or bruised it should emit a strong characteristic odour. This depends on the presence of a volatile oil, which exists in the proportion of 4 to 5 per cent. It is obtained and purified by repeated distillation. The officinal preparations are the oleum carui, aqua, and spiritus. The directions in the Pharmacopœia for preparing the two latter are never complied with; as a portion of the oil dissolved, or diffused through the menstruum, is a more speedy mode of obtaining the object. The oil is sometimes given dropped on sugar. The powers of caraway are similar to those of dill [ANETHUM GRAVEOLENS, P. C. S.], and the observations there made on the use and abuse of this carminative are applicable here.

CARY, REV. HENRY FRANCIS, was born at Birmingham in 1772, and was entered a commoner of Christ Church, Oxford, in 1790; having however already commenced author by the publication of 'An Irregular Ode to General Elliott' in 1787, and of a 4to. pamphlet of 'Sonnets and Odes' in 1788. While at the university he devoted much of his time to the study of Italian, French, and English literature, as well as of Greek and Latin. Having taken his degree of M.A. in 1796, he was in 1797 presented by the Marquis of Anglesey to the vicarage of Bromley Abbat's, in Staffordshire, worth 187*l.* a year, with a residence. The same year he published 'An Ode to General Kosciusko.' In 1805 appeared his translation of the 'Inferno' of Dante in English blank verse, accompanied with the original Italian; and in 1814 his entire version of the 'Divina Commedia.' It was some years however before this work, to which Cary principally owes his literary reputation, attracted much attention. It was first brought into general notice by Coleridge, who is said to have become acquainted with it and with Cary himself about the same time. Ultimately its merits were generally acknowledged, and the author had the satisfaction of bringing out a fourth edition of it before his death. It is not only unusually careful and exact, but deserves the praise of very considerable force and expressiveness. It must, however, be considered as a defect detracting materially from its claim to be regarded as a faithful representation of the 'Divina Commedia' that it is in blank verse: rhyme is an essential element of the Gothic spirit and character of Dante's poetry. Cary afterwards produced verse translations of the 'Birds' of Aristophanes, and of the 'Odes' of Pindar; a series of Lives of English Poets, in continuation of Johnson's, and another of Lives of Early French Poets, in the 'London Magazine;' besides editions of the works of Pope, Cowper, Milton, Thomson, and Young. In 1826 he was appointed assistant librarian in the British Museum, but he resigned that situation in 1832, on the claim that he and his friends conceived he had to the office of keeper of the printed books being passed over in favour of another person. He afterwards received a pension of 200*l.* a year from the crown, which he enjoyed till his death, which took place at his house in Charlotte-street, Bloomsbury, 14th August, 1844. He was interred on the 21st in Poets' Corner, Westminster Abbey.

(*Gentleman's Magazine*, for October 1844.)

CARYOCRINITES, a genus of Crinoidea, from the Palæozoic limestone of North America.

CASH CREDIT. [BANK, BANKER, BANKING, P. C., p. 387.]

CASHMERE, or CACHEMERE, a peculiar textile fabric formed of the fine downy wool found about the roots of the hair of the Tibet goat [GOAT, P. C., p. 283], and so called from the original seat of the manufacture, in the valley of Cashmere, in the north-west of India. [CASHMERE, P.C., p. 342.] Shawls of exceedingly delicate quality are the principal articles manufactured of this material, but a cloth woven in imitation of them is also made, and called by the same name, or by corruption, Cassimere.*

An interesting description of the manufacture of Cashmere or Kashmir shawls is given in Vigne's 'Travels in Kashmir,' from which an extract, entering more fully into the subject than can be done here, is given in the 'Penny Magazine' for August 13, 1842. From this it appears that the thread is dipped in rice-water before weaving, by which process it is made stronger, the stiffness thus imparted being subsequently removed by washing. Of the actual process of weaving we find no satisfactory account. The author of the article 'Shawls' in the new edition of the 'Encyclopædia Britannica' intimates, in common with some other writers, that the process more nearly resembles the weaving of tapestry [TAPESTRY, P. C., p. 46] than the ordinary operation of weaving. The needle is occasionally used in the production of the patterns, but Vigne observes, that 'if the pattern be worked with the needle the shawl is far inferior, in every respect, to those in which the pattern is woven in,' and that 'an excellent pair (the shawls being always made in pairs) of the former description may be purchased in Kashmir for 150 rupis (about 10*l.*), whereas an equally good pair of the usuleh (the real), or the latter kind, could not be procured for less than 700 or 800 rupis.' The process is exceedingly slow, the weaving of a pair of shawls, or, as some writers have it, of a single shawl, often employing three men with a clumsy old-fashioned loom for a period of six months; and owing to the numerous heavy duties charged upon the shawls between leaving the loom and reaching a purchaser in this country, the price of real Cashmere shawls of the best quality is very high. They have frequently been sold in London at from 100 to 400 guineas each, and in one instance, when the import duty, which has since been greatly reduced, amounted to 80 per cent. on the value, as much as 500 guineas was demanded for a single shawl.

The peculiar softness of Cashmere shawls appears to be in some degree attributable to the processes of washing to which they are subjected after weaving. 'The best water for this use,' observes Vigne, 'is found in the canal between the lake and the floodgates at the Drogjun.' 'Some ruins, in large limestone blocks, are lying on the washing-place, and in one of these is a round hole, about a foot and a half in diameter, and a foot in depth; in this the shawl is placed, and, water being poured over it, it is stamped on by the naked feet for about five minutes, and then taken into the canal, by a man standing in the water: one end is gathered up in his hand, and the shawl swung round and beaten with great force upon a flat stone, being dipped into the canal between every three and four strokes.' The shawls, if coloured, are then dried in the shade, as the hot sun would injure the colours, and about ten days afterwards the same process is repeated, though for a less time. White shawls however, after being treated in like manner, are spread in the sun, and bleached by sprinkling water upon them; and the alternate washing and beating, and drying and bleaching in the sun, is repeated three times, soap being occasionally used in the second washing and stamping. 'There is something in the water of the canal,' observes Vigne, 'which certainly communicates to the shawl a softness which cannot be given to those manufactured at any place in the plains of Hindustan.' 'At the same time,' he ad 'those made in Paris or at Norwich would be, I think, as s were it not for the greater closeness of texture, consequent their being made by a machine instead of the hand.' ' the same reason,' he proceeds, 'it is well known that calico made in India is much softer, and is much more dura than that made in England.' The water is readily found n the surface of the ground, is bad tasted, and, Vigne belie brackish. Old shawls that require cleaning, and someti also new ones, are washed by means of the freshly-gathe root of a parasitical plant called kritz. A pound of is bruised and mixed with about three pints of water, to wh is added a piece of pigeon's dung, equal in size to a turke egg, beaten up in about an equal quantity of water. shawl is saturated with this liquor, stamped upon, washed w the hand, and then steeped in the canal. Vigne gives furt particulars respecting the mode of producing a fine p yellow colour by the fumes of sulphur, and various oth matters relating to the manufacture of and trade in Cashm shawls, and an enumeration of the various kinds of fabric p duced in the looms of Cashmere, and states that a cloth ca siling is manufactured from the shawl wool in Yarkund a China, which resembles a coarse English kerseymere in te ture. Respecting the statistics of the manufacture some ad tional information will be found in the articles CASHMERE a GOAT, above referred to, and in M'Culloch's 'Dictionary Commerce,' art. 'Shawls.' Various attempts have been ma to naturalize the Cashmere shawl goat in this and other Eu pean countries, but as the peculiarities of its wool appear to b dependent upon climate, the perfect success of any such a tempt is problematical. The wool itself has also been im ported as a raw material, and Dr. Ure, in the 'Dictionary Arts,' art. 'Cashmere,' gives an account of the various pla adopted in France for working both the imported wool an that produced in France from a breed of Tibet goats importe in 1819, into shawls in imitation of those of Cashmere, which plans the Jacquard loom has been employed to gr advantage. Of the shawl manufacture of Scotland generally much interesting information is given in the article alrea cited from the 'Encyclopædia Britannica;' and also in th article 'Glasgow' in the same work, from which it appea that in 1830, at which time the weaving of shawls from Cas mere yarn imported from France had become an importa branch of manufacture, a premium of 300*l.* was offered b the Board of Trustees for the Encouragement of Arts an Manufactures in Scotland, to the person who should fi establish the spinning of Cashmere wool upon the Fren principle. In consequence of this offer, Captain C. S. Cochrane devoted himself to the subject, and having succeeded, after some difficulty, in obtaining a knowledge of the secret, he patented the plan, and subsequently sold his patent t the Messrs. Holdsworth, of Glasgow, who established th manufacture successfully, and obtained the offered reward i 1832.

CA'SSICUS, a genus of Passerine birds, of the fam *Conirostres*, allied to the beef-eaters and starlings. They a distinguished, among other characters, by their large, coni and sharply pointed beaks. The species of *Cassicus* are a inhabitants of America. They are gregarious, and feed upo grain and insects.

CA'SSIUS, AVI'DIUS, was, according to Dion Cassi a native of Cyrrhus in Syria, and the son of a rhetorician Heliodorus, who was praefect of Egypt in the joint reign Antoninus Pius and Marcus Aurelius. Cassius served in th Parthian wars (A.D. 162 or 165) under Lucius Verus, in whi he defeated Vologesus, and took Seleuceia and Ctesiphon the Tigris. He also served on the Danube, probably abo A.D. 166. He was subsequently appointed governor of Syri and in A.D. 170 he went to Egypt to suppress an insurrecti in the lower country which was excited by some fanati He succeeded in putting an end to the rebellion; but a fe years after (A.D. 175) he himself rebelled against the Emper Marcus Aurelius, and proclaimed himself Imperator in t East. Cassius was assassinated in a few months, a head was carried to Aurelius. The humane empe mented his death, and declared that he wished Cassi that he might upbraid him for his ingratitude. The family a children of Cassius were spared, but it is said that Commod the son of Aurelius burnt alive all the then surviving me bers of the family of Cassius, on the pretence of a fresh co spiracy.

Dion Cassius, who loved a tale of scandal, says that Fa tina, the wife of Aurelius, being apprehensive that her h

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* WOOLLEN AND WORSTED MANUFACTURES, P. C., p. 555. It may be serve that *kerseymere*, though almost identical in sound with *cassi-* fabric, which, according to a letter upon the woollen dis- lished in the 'League' newspaper for August 31, 1844, a *mere*, or miry brook, at the village of Kersey, in

d not live long, and considering the youth of her
iodus, attempted to secure the interests of herself
amily by corresponding with Avidius Cassius, and
n to proclaim himself emperor whenever he heard of
of Aurelius, and take her for his wife. It is said
was a report of the death of Aurelius, and that this
mmediate occasion of Cassius proclaiming himself
It is also said that he was himself the author of the
he death of Aurelius. The letters between Aure-
is wife Faustina on the occasion of the rebellion of
e probably not genuine. Vulcatius attempts to
these letters that Faustina was not privy to the de-
ssius.

ius Gallicanus, *Avidius Cassius;* Dion Cassius, lib.
llemont, *Histoire des Empereurs*, vol. ii.)

GNO, ANDREA DEL, a distinguished Florentine
metimes called the Infamous, was born at Castagno
o, near Florence, about the year 1409, and died aged
nty-four. He was contemporary with Cosimo Roselli
cio, and painted in a style which in some respects
the styles of both masters, but he always remained
Masaccio, though he survived him many years. He
st Florentine painter to adopt the new method of
g, which he learnt from Domenico Veneziano, and
er he had mastered the secret, he basely murdered.
no, Domenico, P. C.] Very few of Castagno's
l remain: there are three in the gallery of the
of Florence, of which St. Jerome in the Desert is a
eat merit for its period; there are also two or three
oticed by Vasari, in religious buildings of Florence.
the Pazzi and other conspirators concerned in the
Giuliano de' Medici, were all painted by Castagno
y the feet on the façade of the palace of the Podestà;
done with such ability, and in such a variety of
that Castagno was thenceforth called Andrea degli
(of the hanged). It was his best work, but it has
perished.

, *Vite de' Pittori*, &c.; Baldinucci, *Notizie dei
del Disegno*, &c.)

GLI'ONE, GIOVANNI BENEDETTO, called
rench LE BENEDETTE, and at Mantua IL
ETTO, was born at Genoa in 1616, and was one
st distinguished of the Genoese painters, and an
etcher. He was placed by his father with G. B.
l upon his death very soon afterwards with Andrea
i, and finally, it is said by Soprani, Lanzi, and others,
yck, who certainly lived some time in Genoa, but,
r a short visit, scarcely later than 1625, when
e was only nine years old, if Soprani's date is cor-
is improbability, and the fact that Paggi did not die
, render the report of his having studied with Van-
ly improbable. Vandyck was established in Eng-
32, and Castiglione was then only 16 years of age,
yck did not settle in England until some years after
from Italy.

one painted in various styles, as history, portrait,
and animals. He excelled in all, but most in
nting and in pastoral landscape; in animals he has
superior in Italy. His masterpiece is the Nativity
iour in the church of San Luca, and it is one of the
res in Genoa: there is an etching of it by himself.
at Mantua in 1670, in the service of the Duke
he had lived also for short periods in Venice, Flo-
me, Naples, and Bologna; in Florence he was so-
paint his own portrait to be placed in the painters'
llery there.

one executed a considerable number of etchings,
very highly valued; many of them are much in the
ose of Rembrandt: Bartsch describes sixty-seven.
he entrance of the beasts into the ark, is charac-
the particular taste of Castiglione; he generally
ects in which he could introduce animals, as fairs,
c., and he seems to have had also a partiality for
cripture subjects of the kind. For execution, three
etchings are—the Discovery of the bodies of St.
St. Paul, a night-piece; Diogenes in search of an
n; and Melancholy. The majority of his paintings
and the figures introduced into them are seldom very
he is also sometimes inharmonious in his colouring,
in his shadows. The name of Grechetto was given
one, according to Soprani and Lanzi, on account of
of his colouring; but how the term is applicable
y evident. Salvatore and Francesco Castiglione, the brother and the son of Giovanni Benedetto, were both his pupils, and were able painters.

(Soprani, *Vite de' Pittori, &c. Genovesi;* Lanzi, *Storia Pittorica*, &c.; Bartsch, *Peintre-Graveur.*)

CASTOR OIL. [Ricinus Communis, P. C.]

CASUARINA. [Casuaraceæ, P. C.]

CAT-FISH. [Anarrhicas, P. C. S.]

CATABRO'SA, a genus of plants belonging to the natural order of Grasses, and to the tribe Festucineæ of that order. It has unequal very short glumes, rounded or truncate, without lateral ribs, much shorter than the spikelet; the flowers usually two, rounded on the back, distant; the outer palea membranous, with three ribs ending in teeth, which do not quite extend to the summit, and are connected by the scarious margin; the styles terminal; the upper glume has two very short faint lateral nerves, the awn absent. This is a genus formed by Palisot de Beauvois, and adopted by Babington in his 'Manual of British Botany.' The only British species is the *C. aquatica;* it has an equal panicle, with half-whorls of patent branches, and obtuse broadly linear leaves. It is found in ponds and ditches, and wet sands.

(Babington, *Manual of Brit. Bot.*)

CATALPA, a genus of plants belonging to the natural order Bignoniaceæ. It has a two-parted calyx; campanulate corolla, with a ventricose tube, and an unequal four-lobed limb; five stamens, two of which are fertile, the other three sterile; the stigma bilamellate; the capsule silique-formed, long, cylindrical, two-valved; the dissepiment opposite the valves; the seeds membranous at the margin, with pappus at the base and apex. The species are trees with simple leaves, opposite or disposed three in a whorl; the flowers terminal, panicled.

C. syringæfolia has flat cordate leaves, three in a whorl. This plant is a native of North America, and is found on the banks of the Ohio, Mississippi, and Delaware, also in the forests on the Wabash in Illinois, where it occurs in so great abundance that the wood is cut up for palings. It is a low-spreading, singular-looking tree, with succulent shoots, easily injured by the frost. The leaves are large and come out late; the petals are white, spotted with purple and yellow. It is a plant well adapted for large shrubberies. There is one in the gardens of Gray's Inn, which is said to have been planted by Lord Bacon. The branches are used for dyeing wool of a cinnamon colour. The name of the genus appears to have been derived from the plant growing on the banks of the Catawba river. It does not bear fruit in this country.

C. longissima has oblong or ovate-lanceolate leaves, acuminated, three in a whorl, undulated. It is a tree thirty or forty feet in height. It contains much tannin in its bark, and might be used for tanning. It is said to be serviceable in humoral asthma. It is known in the West Indies by the name of French oak, and the French call it *Chêne-noir*.

There are several other species of Catalpa, all elegant plants. The *C. syringæfolia* thrives well in common garden soil, and may be propagated by seeds or divisions of the root. The other species grow well in a mixture of loam, peat, and sand, or any light rich soil. Cuttings, half-ripened, root readily, if planted in sand with a hand-glass over them.

(Don, *Gardener's Dictionary;* Burnett, *Outlines of Botany.*)

CATAMARAN is a name given both in the East and West Indies to some kinds of rafts which are used in short navigations along the sea-shore. The rafts which are used by the fishermen and others at Madras consist of three logs of timber, each eight or ten feet long, which are lashed together. With these rafts the rowers pass through the surf to fish, or to convey refreshments to ships when no boat could venture off. On the coast of South America the rafts are of considerable size, being made of trunks of trees from 70 to 80 feet long, lashed together, and being from 20 to 25 feet wide: the middle trunk is longer than the rest, and projects beyond them at the after extremity. They carry sails on masts resembling shears; and they are steered by raising or lowering, as the occasion may require, a board which enters vertically between the timbers either at the fore or after part of the raft.

CATCHFLY. [Silene, P. C.]

CATECHI'NUM, *Medical Properties of*. This peculiar principle is obtained not merely from Catechu, strictly so called, but also from gambir and some kinds of cinchona bark. Certain slight differences are found in it, according to the source whence it has been obtained, such as that from catechu having no acid reaction on litmus, while the others have. The best mode of procuring it is to digest catechu in sulphuric æther, then evaporate the æther, wash the residuum in cold water, repeatedly dissolve it in boiling water, and by renewed evaporation procure it pure. The appearance is that of a white semicrystallized powder (resembling magnesia or grape-sugar), with an astringent taste, which is followed by an unpleasant and somewhat sweetish one. It is persistent at the ordinary temperature of the air, but by long exposure to damp it resolves into a mould-like mass; at a moderate heat it melts into a transparent fluid; by a strong heat it becomes brown.

Of hot water it requires only from three to four parts for its solution, but of cold 16000: of boiling alcohol from two to three, of cold from five or six parts for its solution; of boiling æther it requires seven to eight, while of cold it needs a hundred and twenty for its solution. It is one of the most delicate tests of some of the salts of iron (when these are devoid of any free acid), as it strikes a most beautiful dark green colour, without precipitation; which colour results if there be but $\frac{1}{98000}$ part of iron in solution. It does not precipitate either a solution of gelatine or of starch, a peculiarity which distinguishes it from tannin; and which constitutes its claim to attention as a therapeutic agent, as a means of arresting hæmorrhage in distinct organs. Pure tannin is almost certainly precipitated by the starchy or gelatinous principles it meets with in the food in the primae viae, and has therefore little influence on hæmorrhage from remote organs. All who know the difficulty of checking the flow of blood in those of a hæmorrhagic diathesis, especially from leech-bites, scarification of the gums, &c., will be glad to have a new resource in catechin.

CATENI′PORA, a genus of corals found only in the Palæozoic strata, and in Britain only in Silurian rocks. [MADREPHYLLIŒA, P. C.]

CATGUT, AND VIOLIN-STRINGS. Several useful articles, manufactured from the intestines of the sheep, are, for some unexplained reason, denominated catgut. The catgut is generally in the form of cord, string, or twine. The chief purposes to which such cord is applied, are musical strings, for harps, violins, and guitars; hatters' bowstrings, for the bowing of fur and wool; clockmakers' cord, and thongs or cords for whips; for all of which purposes the material requires a careful preparation before being brought into the state of cord

The intestines, when taken from the animal, are, by repeated washing and scraping, freed from the loose adherent matters; and are further steeped for some time, as a means of loosening the surface membranes. When this steeping has brought them to a particular state or stage, they are laid on a sloping board, and scraped with the back of a knife, in such a manner as to peel off two strips of peritoneal or external membrane, each equal in width to half the circumference of the intestine. The membrane so removed is called by the French *filandre*, and is employed by them, when further prepared, for making the cords for rackets and battledores, and also as thread for sewing pieces of intestine together for other purposes. When the membrane is removed, the intestine is again steeped in water, and the inner or mucous membrane scraped from it; and it is also exposed to the action of an alkaline ley, until at length it is brought to as clean a state as possible. The large ends are cut off and applied to other purposes; the smaller ends are laid by for making cord.

In the making of violin-strings, after the cleaning, the intestines have a certain degree of twist imparted to them. Two or more are affixed, at the ends, to a rotating machine, and twisted round each other somewhat in the same way as twine or silk. The size of the membranes and the number of them twisted together, depend on the thickness of the string to be made. The twisted strings are exposed to the action of sulphur in a closed chamber, and are then rubbed with a horsehair cloth; these processes are repeated two or three times. If a string be sulphured too much, it becomes too brittle; if too little, it rarely keeps in tune, and the determination of the proper degree of sulphuring is a nice point in the manufacture.

The Italians have often had the reputation of making better violin-strings than any other people. The violinists of England, France, and Germany acknowledge the fact, but without being able to assign a sufficient reason for it. Dr. Ure suggests the following considerations: It is well known to physiologists that the membranes of lean animals are far more tough than of those animals which are fat or in high condition. In London, where no lean animals are slaughtered, the membranes of the sheep are supposed to be less tough and tenacious than those of Italy, which are not so highly fed. Hen inferred that the membrane employed by the Italians is fitted for the manufacture than that used by the manufacturers. Whether this be so or not, the fact pre-eminence is admitted. Otto, in his Treatise on the (translated from the German by Mr. Fardely), says i tion to violin strings: 'The best strings which have under my observation are those from Milan, which a under the name of Roman strings; they are now to be almost every music shop. I shall point out the signs by the best strings may be distinguished, as there are some tions of them manufactured at Neukirch, in Voigtland, hemia, and in the Tyrol, which are sold for Italian. Milanese strings are as clear and transparent as glass. third string should be equally clear as the first. The by no means feel smooth to the touch, for they are not or polished off by any process, as all other manuf strings are. If a good string be held by one end finger, and opened out, it will recoil to its former like a watch spring. Every string, when stretched instrument, should look like a thin strip of glass on the board: those which are of a dull and opaque appearan useless. The Milanese strings are also distinguished b separate one being tied twice with red silk; which h the Neukirch string-makers have imitated. Their el is after all the best criterion; as no other strings which tried have that strength and elasticity for which the M are so much esteemed.'

The thickest string of the violin, and many other strings, are coated with an envelope of fine wire. done by stretching the string very tightly, applying th at one end of it, and causing the wire to coil helically the string by giving to it a rotatory motion.

For the strong thick cord used for hatters' bowstrin largest of the membranes are used, after being cleans prepared; from four to twelve of them being twisted to according to the size of the cord to be produced. The are twisted to a length of fifteen, twenty, or twenty-fiv and to effect this, pieces of the membrane are sewed end, till they produce the required length. While un process of twisting, the cord is well rubbed betwe fingers, to equalise the thickness. The cord is e twice to the fumes of sulphur, and is rubbed repeatedly wards.

The catgut employed by clockmakers is prepared fr smaller intestines, well prepared with potash. The membranous tube is sometimes cut into two strips in a way. The tube is drawn over a ball, behind which is of knife having two cutting edges or blades, whereby th is ripped up into two oblong strips of equal width. method somewhat resembles that by which straws ar for the straw-plait manufacture. For larger and st purposes, clockmakers sometimes use cord composed or more intestines twisted together, as for violin-strings. catgut for whips and similar purposes is prepared and w much in the same way; short pieces being sewed toget produce a piece of the requisite length, and this being t to give it a sufficient degree of strength.

For the mode of preparing, from a membrane coveri intestine of the ox, the fine pellicle known by the na 'gold-beaters' skin,' see GOLD-BEATING, GOLD-BE SKIN, P. C. S.

CATHARTOCARPUS (from καθαίρω, to purge κάρπος, fruit), a genus of plants belonging to the natura Leguminosæ. It has very blunt sepals, hardly joined base, more or less unequal; five unequal petals; ten u free stamens, the three lower ones longest, the four ones short and straight, the three upper ones bearing a difformed anthers; the anthers ovate, opening by two at the apex; the ovary stipitate; the legumes terete or compressed, indehiscent, woody with elevated sutures, versely many-celled inside, the cells 1-seeded and fille pulp; the seeds elliptic, rather compressed, horizontal. species are trees with abruptly pinnate leaves and race large yellow flowers. In appearance they are not unli common laburnum when in flower. This genus of pla formerly comprehended under Cassia [CASSIA, P. C was separated by Persoon, who has been followed by L Nees von Esenbeck, and others. The habit of these and the character of their fruit, differ from the sp Cassia. It is also undoubtedly desirable that a gen Cassia, with nearly two hundred species, should b divided.

. *Fistula*, the Purging Cassia, or Pudding Pipe-tree,
leaves with 4-6 pairs of ovate, rather acuminated glabrous
ets; the petioles glandless; the racemes loose, bractless;
legumes cylindrical, rather obtuse, smooth. It is supposed
ave been originally a native of tropical Africa, but is now
nsively diffused over the globe, and is found abundantly
Hindustan, China, the East Indian Islands, the West
es, and South America. It is a tree from thirty to forty
high, with yellow flowers and long cylindrical black
, from nine inches to two feet in length. The valves of
pod are thin, hard, and brittle; and its cavity is divided
umerous thin brittle transverse dissepiments; the parti-
s thus formed have each a single hard flattened ovate seed,
ounded by a soft pulp. The pulp has a sweetish flat,
unpleasant taste, and is separated by boiling the pod in
er, straining the fluid, and then evaporating it to the consist-
e of a thick extract. This extract acts as a mild purgative
the system, and was long in great repute in Europe on that
ount. It is now however seldom used; and although
itted into the lists of materia medica of the British Phar-
copœias, is only placed there as entering into the composi-
n of the Electuarium Cassiæ and the Confectio Sennæ.
e pulp, according to Henry, consists of 61 per cent. of
ar, 6·75 of gum, and 13·25 of tannin. It probably also
tains *Cathartine* or an analogous principle.

C. *Javanicus*, Horse Cassia, has leaves with 12-15 pairs of
te, obtuse, glabrous leaflets; glandless petioles; axillary
emes; nearly cylindrical, very long, and transversely torose
umes. It is a native of Java and the Moluccas. Its legumes
above two feet in length, and contain a black cathartic
p, which is used as a horse-medicine in the East Indies.

Don has described a species of Cathartocarpus (*C. conspi-*
us), a native of Sierra Leone, where the pods are called
nkey Drum-sticks. In the Gardener's Dictionary there
e fifteen species of Cathartocarpus described.

(Christison, *Dispensatory;* Don, *Gardener's Dict.*)

CATILLUS, a fossil genus of bivalve shells, allied to
natula and Perna, so named by Cuvier and Brongniart. In
e chalk occur species of large size, remarkable for their
gely fibrous texture. They have also been called from this
cumstance Inoceramus by Sowerby, who includes in the
us one species from the lias and others from the golt.

CATO, DIONYSIUS. [Dionysius Cato.]

CAU'CALIS, a genus of plants belonging to the natural
der Umbelliferæ, the suborder Campylospermeæ, and the
be Caucalineæ. It has a calyx of five teeth, the petals ob-
late, with an inflexed point, outer ones radiant and bifid,
e point slightly laterally compressed, the carpels with fili-
m bristly primary and more or less prominent secondary
es, all bearing 1-3 rows of prickles. The species are
bs with multiplied leaves, and white flowers. They are
ed by the common name of Bur-parsley. Two of the
cies are found in England, *C. daucoides* and *C. latifolia.*
y are found in corn-fields on chalky soils; the last is a
e plant, and has been probably introduced.

(Babington, *Manual of Brit. Bot.*)

CAULERPITES, a group of fossil fucoid plants, of
ich many species occur, scattered through nearly all the
rine formations. In the oolites seven species have been
nd. The recent genus Caulerpa is found in warm southern
mates.

CAULO'PTERIS. [Coal-Plants, P. C.]

CAVALLI'NI, PIE'TRO, a celebrated old Roman
inter of the fourteenth century, and one of the earliest
sters of the modern Roman school, was born at Rome in
e latter half of the thirteenth century, and lived at Rome
ring the interval that the popes resided at Avignon.
sari's account of Cavallini is somewhat inconsistent with
e period of his death as adopted by Manni and Lanzi, 1344;
t if, as Vasari says, he was eighty-five when he died, he
st have been a much older painter than Giotto, and can
rcely, as he states, have been his pupil. Vasari however
s that Cavallini was living in 1364, but so many of his
es have been found to be incorrect, that he cannot be
ctly depended upon. Cavallini was painter, architect, and
ker in mosaic. He assisted Giotto in the mosaic or Navi-
la of the porch of St. Peter's; and there are still some of
own mosaics in the Basilica of San Paolo and at Santa
ria in Trastevere at Rome. He executed also many
tings in the churches, but there are no remains of them;
last were destroyed by the fire which, in 1824, almost
rely consumed the above-mentioned old Basilica of San
lo, outside the walls of the city: the mosaics however, and a miracle-working wooden crucifix made by Cavallini, remained uninjured.

Cavallini painted also several frescoes at Florence, Orvieto, and at Assisi, some of which are still in a tolerable state of preservation. A crucifixion in the church of Assisi is the most remarkable and the best preserved. It contains a crowd of figures, some on horseback, and dressed in a variety of costumes; in the sky, which is a deep bright blue, are several angels. It is a work of great labour, and though the design is very angular, the figures sometimes distorted, and the perspective incorrect, the figures have expression and character, and if we consider the examples which can have been his only guides, we must pronounce it a highly creditable and meritorious work. The fact that Cavallini's works, especially his heads, are very inferior to those of Giotto, is, considering his industry and powers of observation, one reason for concluding that he was an older painter than Giotto. Under this supposition there is nothing inconsistent in the belief of Vertue, that Cavallini designed the crosses which were erected to Queen Eleanor, and that he was the Petrus Romanus Civis of the inscription on the shrine of Edward the Confessor in Westminster Abbey, and accordingly the architect of the shrine, which was finished in 1270. Walpole adopts the supposition, and concludes that Cavallini returned to England with the abbot Ware, who was elected in 1260, and went shortly afterwards to Rome to receive consecration from Urban IV.

The celebrated miracle-performing picture of the Annunciation, or la Nunziata, in the church de' Servi at Florence, formerly attributed to Cavallini, is now with more certainty attributed to a Maestro Bartolomeo who lived at Florence in 1236.

(Vasari, *Vite de' Pittori*, &c.; Lanzi, *Storia Pittorica*, &c.; Walpole, *Anecdotes of Painting*, &c.)

CAVALLO, TIBERIUS, a distinguished electrician, was born at Naples in 1749, and in the university of that city he completed his education. In 1771 he was sent to London, in order that he might attain a correct knowledge of the mode in which mercantile transactions are conducted in England, but he soon abandoned the pursuits of commerce for those of natural philosophy, and in these he continued to be engaged till his death, which took place December 6, 1809. He was buried in old St. Pancras churchyard, London.

Cavallo was less distinguished for originality of thought than for his vast industry in the research of the laws of nature by the way of observation and experiment, and for his highly retentive memory; he possessed this faculty to such a degree that, at an age when he was unable to comprehend the reasoning employed, he knew by heart all the propositions and demonstrations in the books of Euclid. He had considerable skill in music, for which he retained the taste even after his sense of hearing was considerably impaired. He was appointed a member of the Academy of Sciences of Naples in 1779, and in the same year he was elected a fellow of the Royal Society of London.

The labours of Cavallo consisted chiefly in the performance of experiments relating to electricity and magnetism, by which he contributed much to the improvement of those branches of philosophy: he also made researches concerning the composition of the atmosphere and the characters of minerals. In order to determine the nature of the electricity in the atmosphere he employed what he called an 'atmospherical collector:' this was a long rod having at one extremity a small glass tube terminating with a cork from which were suspended two pith balls. The rod being held out as far as possible from an upper window of the house, when the balls diverged by the electricity of the atmosphere, they were drawn in, and the nature of the electric fluid was ascertained by examination. In 1775, while residing near Islington, he made a remarkable experiment with a kite, raised in the air to the height allowed by 120 yards of string, from which he ascertained that a great quantity of electricity may exist in the atmosphere without producing thunder or lightning. A small cloud passing over the house, he charged some jars with the electricity obtained from it, which he found to be positive; by degrees the quantity diminished till it became insensible, but after a short time a great dark cloud rising towards the zenith, the fluid, which began again to be manifest, was found to be negative: the electricity continuing to increase and the rain falling copiously, he pulled in the kite lest some serious accident should happen; and in doing this, he received many strong shocks in his arms, breast, and legs. He frequently made experiments of this kind, with kites which were about four feet long and two feet wide; the string was of common twine twisted with threads of fine copper-wire.

He invented an instrument called a 'condenser of electricity,' which consisted of a tin plate between two parts of a wooden frame covered interiorly with gilt paper: the plate was isolated by being supported on glass pillars; and one edge being connected with the body containing the electricity, the effect of the condensation was shown, at the opposite edge, by the electrometer. He invented also a 'multiplier' of electricity, which consisted of two brass plates insulated by being supported on glass pillars, and of a third plate which could be insulated or uninsulated at pleasure: this last being fixed to a lever which turned on a pivot, after receiving electricity from one of the former plates, conveyed it to the other, with which an electrometer was connected: returning from the second plate to the first it received a fresh supply of electricity, which it conveyed in like manner to the other; and so on, till a sufficient quantity was accumulated on the latter.

Among his experiments was one in which were exhibited some remarkable phenomena of the electricity in glass tubes containing mercury. The mercury was boiled in the tube, and the latter being afterwards sealed, on elevating and depressing alternately the ends, electricity was excited by the friction of the mercury: this changed from positive to negative, and the contrary, as the tube was placed in direct and inverted positions.

Cavallo invented also a simple micrometer consisting of a thin and narrow slip of mother-of-pearl divided into parts each equal to $\frac{1}{200}$ of an inch; this being fixed in the diaphragm of a telescope, at the focus of the eye-glass, served for measuring small angles.

Besides four Bakerian lectures on thermometrical and magnetical phenomena, and several papers on electricity and other subjects, in the 'Philosophical Transactions,' Cavallo published, in London, 1, 'A Complete Treatise on Electricity,' 8vo. 1777; 2, 'An Essay on the Theory and Practice of Medical Electricity,' 8vo. 1780; 3, 'A Treatise on the Nature and Properties of Air,' &c. 4to. 1781; 4, 'The History and Practice of Aerostation,' 8vo. 1785; 5, Mineralogical Tables,' 1785; 6, 'A Treatise on Magnetism in Theory and Practice,' 8vo. 1787; 7, Description and Use of the Mother-of-Pearl Micrometer,' 8vo. 1793; 8, 'Essay on the Medicinal Properties of Factitious Airs,' &c. 8vo. 1798; and 9, 'Elements of Natural and Experimental Philosophy,' 4 vols. 8vo. 1803.

(Aikin's *General Biography*; Chalmers's *Biographical Dictionary*.)

CAVENDISH, MARGARET, DUCHESS OF NEWCASTLE. This eccentric lady, the youngest daughter of Sir Charles Lucas, was born in Essex towards the close of the reign of James the First. In 1643 she was appointed a maid of honour to Henrietta Maria; and, accompanying the queen to Paris, she became in 1645 the second wife of William Cavendish, who had formerly been Earl and was then Marquis of Newcastle, and who had borne arms in the civil war with courage and self-devotion. The exile of the Marchioness and her husband was chiefly spent at Antwerp, and was accompanied by frequent pecuniary embarrassments, which she had the spirit to avow in her memoir of her husband's life. Both of them were forced at one time to pawn even their clothes. A visit which she paid to England was unsuccessful in procuring any grant out of the family estates; but assistance furnished by relations enabled the Marquis and his wife to subsist more comfortably till the Restoration. On that event they returned to England; and in 1664 the Marquis was created Duke of Newcastle. The remainder of their married life was spent in the retirement of the country. The Duchess died in the end of the year 1673, and her husband, aged eighty-four, in 1676.

The period which succeeded the acquisition of the dukedom was chiefly devoted by the noble pair to that course of literary study and composition, which, however creditable in the motive, was rendered so whimsical by the eccentric character of the parties. Horace Walpole, in his 'Royal and Noble Authors,' found a tempting theme for his ill-natured wit in the picture of the duke and duchess, prosecuting their harmless occupations with an aristocratic forgetfulness of the whole world besides, each regarding the other as the greatest genius of the times, and each lavishing on the other, in conversation and in print, the most extravagant hyperboles of commendation. The Duke had long before appeared more than once as an author; and particularly by the publication of his work on Horsemanship, first printed in French at Antwerp in 1658, and after-
wards in English, with alterations, at London in
the later period of his life, the example of his wi
him to perpetrate some comedies which were even
her own. She was indeed at once the more ambiti
far the more industrious writer of the two. There w
any department of composition, either in prose or i
which she did not exercise her ready pen. Her
constituted mind was always in fermentation; and,
with recording its products at ordinary hours, she
of her attendant ladies within call even during th
write down the bright thoughts that arose in hour
lessness. The result of this distempered activity
lection of ten printed folios, besides other works
saw the light. Catalogues of these, and of the Du
will be found in Walpole and in the Biographia
The best known works of the Duchess are her two
plays, published respectively in 1662 and 1668.
sions deserve a passing inspection from the student
history, both as monuments of unredeemed and
absurdity, and as examples of some principles in lit
position to which no author before or since has
bold enough to avow obedience. Not only for
laws of style, but even for the ordinary rules
grammar, 'the thrice noble, illustrious, and exceller
(as her title-pages call her) professed a sovereign
In several of those nine addresses 'to the Reade
besides other prefaces, stand in succession befor
volume of plays, she magnanimously declares her
that her writings should be unread by 'such pedan
lastical persons' as attach importance to grammati
tions of gender, and to those other laws of langu
which she announces, that, if she understood them,
not, she would not follow them. Her practice was
formable to this frank profession. It is rarely, fo
that she condescends to join a plural verb with a pl
native. But all such technical faults are as nothing
with the childish and senseless extravagancies whi
plays make up the whole tissue of the matter. T
in one of them a scene that is dramatic in anythi
form. That they should be free from coarseness
be expected in such an age; but some of the most
scenes are carefully marked as having been writte
Lord Marquess.' The philosophical discussions wh
throughout are claimed by the lady as her own.

CAVENDISH, WILLIAM, Duke of Newcas
VENDISH, MARGARET.]

CEAN-BERMUDEZ, JUAN AUGUSTIN,
few writers on art Spain has produced, was born
the Asturias, in 1749, and was the son of poor par
was educated in the Jesuits' College at Oviedo, wh
his good fortune to find not only a companion but a
protector in Jovellanos [JOVELLANOS, P. C.], with
resided two years at Alcala and Seville, and then
him to Madrid, in 1778. During Jovellanos'
shortly afterwards from office he returned with him
where his admiration of the monuments of that city
apply himself to a systematic course of study in ar
and drawing. Encouraged by Jovellanos, he pro
Madrid in order to place himself under Mengs, b
artist shortly after returned to Rome, he had not
to profit by his instruction. When Jovellanos was
office he procured an appointment for his friend. S
afterwards Bermudez obtained a small pension, whi
him to devote himself entirely to his literary purs
historian of Spanish art. His first publication was
cionario Historico de los mas illustres Professores de
Artes en España,' 6 vols. 8vo. 1800; and his o
'Descripcion Artistica de la Catedral de Sevilla,' 18
scripcion del Hospital del Sangre,' 1804; 'Carta
Estilo, etc. de la Escuela Sevillana,' 1806, in which
the progress of the Seville school of painting from t
of the fifteenth century; 'Dialogo sobre el Arte d
1819; and lastly the 'Noticias de los Arquitectos y
tura en España,' 4 vols. 4to., 1829, &c., a work foun
materials collected by Eugenio Llaguno, who shor
his death gave them to Bermudez, insisting upon h
use of them. Bermudez accordingly afterwards
arranged and shaped them for publication, but ma
sive additions and enlargements, and carried on t
to the close of the eighteenth century. Valuabl
work is for the mass of information and copious
which it contains, it is rather one for mere refer
perusal, it being not so much a critical history of

as an industriously compiled register of facts,
lates.

ie preceding there is one other publication of
ationed—the 'Memorias para la Vida de Jovel-
id, 1814, in which he has left an affectionate por-
hat excellent friend. Cean-Bermudez died in
ft several manuscript works, one of which, on the
quities of Spain, was afterwards edited at the
e Royal Spanish Academy of History.

THUS, a genus of plants belonging to the natural
naceæ. The calyx is 5-cleft, campanulate, cut
lowering, with the base permanent and adhering
petals hooded, with long spreading claws; fruit
, loculicidal, with papery valves; cells 1-seeded.
are smooth or pubescent shrubs, with erect
lternate serrated, 3-nerved leaves; and very
te blue or yellow flowers disposed in terminal
in axillary racemes. They are natives of North

canus, Red Root, New Jersey Tea, has ovate,
errated leaves, pubescent beneath; flowers ar-
xillary elongated thyrses, with a pubescent rachis.
of the twigs of this plant is used in Canada for
ases. During one of the wars with America, the
s plant were used in New Jersey as a substitute
dyes wool of a fine strong nankin-cinnamon
s a beautiful shrub when in flower.

several other species of this genus, natives of
outh America. They are small neat shrubs, with
ts, which give them the name of Red Root. They
ell in this country, and may be planted in any
den soil, and form proper plants for the front of
They may be propagated by layers or seeds.
Mexico and the greenhouse species must be pro-
frost during the winter. Cuttings will root in
hand-glass.

Flora Medica; Don, *Gardener's Dictionary*.)

ANS. [SIPHONOPS, P. C.]

PIA. [URTICACEÆ, P. C.]

A'CEÆ, a natural order of plants, belonging to
us group of polypetalous exogens. The species
ees: the timber is usually compact, scented, and
veined; the leaves are alternate, pinnated,
les; the flowers in terminal panicles. The
racters of the order are: calyx 4-5-cleft, petals
an the sepals; stamens 8-10, the filaments either
tube, or distinct, and inserted into a hypogynous
yle and stigmas simple; the cells of the ovary
ber to the petals or flower, with the ovules 4 or
imbricated in two rows; the first capsular with
parable from the dissepiments, with which they
e seeds flat winged, albumen thin or none. This
ly related to Meliaceæ, from which it is chiefly
by its winged and indefinite seeds. The fol-
ynopsis of the genera:—

a. Calyx 5-toothed; petals adnate to the torus;
istinct; capsule 5-celled, 5-valved; seeds nume-
side of the dissepiment ending in a wing.

ina. Calyx 4-5-cleft; stamens 8-10, joined into
sule 5-celled, 5-valved; seeds numerous, each
to a wing.

xylon. Calyx 5-cleft; stamens 10, connected at
apsule 3-valved, 3-celled; seeds 4 in each side,
ent drawn out into a wing.

rsia. Calyx 5-cleft; stamens 10, alternate ones
sule 5-valved, 5-celled; seeds 2 in each side of
ent, ending in a wing at the top.

a. Capsule 5-celled, 5-valved; seeds 3 on each
lissepiment, ending in a wing at both ends.

Toona, Bastard Cedar, has lanceolate leaflets,
ntire, pale glaucous beneath. It is a native of the
where it is called Toon. It has an erect trunk
ight and size, with smooth grey bark. The
ery numerous, small, white, fragrant, like honey.
e numerous, imbricated, winged. The bark is a
ringent, and is said to be a good substitute for
rk in the cure of periodic diseases. Dr. Blume
Java with much success in the various forms
entery, diarrhœa, &c. Horsfield also used it in

a, leaflets ovate-lanceolate entire on short stalks.
of Barbadoes and the Caribbee Islands. It is
with a rough bark. The fruit is about the size of a partridge-egg. When fresh, the bark and berries smell like assafœtida. The trunk is hollowed out into canoes and pariaquas. The wood is of a brown colour, and has a fragrant odour, from which circumstance it is called in the British West India Islands, Cedar. It is frequently cut into shingles for covering houses, but is not adapted for ship-building, on account of its being subject to the attacks of worms. It is not adapted for casks, as it gives its odour to whatever is placed in contact with it.

C. febrifuga (*Soymidia febrifuga*) has leaflets ovate-oblong, acuminated quite entire. It is a native of Java. Its bark is said to have a better effect on some of the fevers of India than cinchona. It is also a powerful astringent. The wood is good for many purposes.

An essential oil called wood oil is found in *Chloroxylon Swietenia*, which is a native of the East Indies. The wood is of a deep yellow colour, and called *Satin-wood*, remarkably close-grained, heavy, and durable, and comes nearer to box-wood than the produce of any other tree. *Flindersia* possesses a volatile oil. *F. Australis* is a native of New Holland, and its wood is said to be not inferior to mahogany. *F. Amboinensis* is a native of the islands of Hitu and Ceram. The spiny part of the fruit is formed into rasps. It was on this account called by Rumphius *Arbor radulifera*. *Oxleya xanthoxyla*, is a native of New Holland. It attains a height of 100 feet. The wood is yellow, and employed for building boats. It is called *yellow-wood*. For the properties of other species of the order see SWIETENIA, P. C.

(Lindley, *Flora Medica*; Don, *Gardener's Dictionary*; Lindley, *Natural System*.)

CELE'STI, ANDRE'A (*Cavaliere*), a very distinguished painter of the Venetian School, was born at Venice in 1637, and died there in 1706. He was the scholar of the Cav. Matteo Ponzone, but not his imitator. Celesti's works are very attractive, especially in colouring, in which he resembles Paul Veronese; they display also great power both of conception and design, and are remarkable for their costly draperies and general facility of execution. He painted landscape, history, sacred and profane, and *genre*; cabinet pictures, gallery pictures, and altar-pieces. He is seen to much advantage in the gallery of Dresden, where there are five pictures by him, three of unusually large dimensions, and the figures are the size of life in all. The following three are strikingly rich in colour, Bacchus and Ceres, Samson delivered into the power of the Philistines, and the Murder of the Innocents. The remaining two are the Israelites bringing offerings for the making of the Golden Calf, and the sack of a city by night: the last is the largest picture in the collection, being very nearly 23 feet long by 13 high. Notwithstanding however the attractive colouring of Celesti, his middle tints are often insignificant compared with his lights and shadows, a defect which is attributable probably to his painting upon dark grounds, a practice which prevailed very much in Venice in his time.

(Boschini, *Pitture di Venezia*.)

CELLULARES. [VASCULARES, P. C.]

CELSIA (named by Linnæus in honour of Olaf Celsius, D.D., professor of Greek, and afterwards of Theology, in the University of Upsal), a genus of plants belonging to the natural order Solanaceæ. It has a 5-parted calyx, a rotate 5-lobed corolla, 4 perfect stamens, didynamous, bearded. All the species are herbs with simple or pinnate leaves, the flowers disposed in loose terminal racemes, each rising from the axil of a bract or small leaf.

C. orientalis has the lower leaves jagged, those of the stem bipinnate. It is a native of Cappadocia and Armenia.

C. sublanata, shrubby clothed with woolly tomentum, the leaves oval-oblong obtuse, crenated, wrinkled, soft. It is now cultivated in this country, but its native district is unknown. It has sweet-scented flowers. There are several other species of *Celsia*, all of them closely resembling the species of *Verbascum*, under which genus many of them have been described.

In the cultivation of the species of Celsia, the seeds should be sown on a gentle hot-bed, and when the plants are large enough, they should be set in separate pots, as they require the protection of a green-house or frame the first winter. In the second year they may be planted out, about the month of May, in any warm sheltered situation. They will flower and ripen their seed in the open air. *C. sublanata* and *C. parviflora*, being shrubby plants, should be treated as Pelargoniums or other greenhouse shrubs.

(Don, *Gardener's Dictionary*.)

CELSUS, P. JUVE'NTIUS, was the son of Juventius Celsus, also a jurist. This Celsus the father is spoken of by Celsus the son, and also by Neratius and Ulpian, in which passages he is always spoken of as Celsus the father. The extracts from Celsus in the 'Digest' are supposed to be from the works of Celsus the son. The son was twice consul according to Pomponius (*Dig.* 1, tit. 2). It is uncertain in what year he was first consul, but his second consulship belongs to the thirteenth year of the emperor Hadrian (A.D. 129), as appears from an extant inscription and a senatusconsultum of that time which is preserved (*Dig.* 5, tit. 3, s. 20). Celsus is also mentioned as a member of Hadrian's consilium, by Spartianus (c. 18); but he is called Julius Celsus.

The younger Celsus was the author of a work entitled 'Digesta,' in thirty-nine books, as appears from the Florentine Index. He wrote also Epistolae, of which the eleventh book is cited by Ulpian (*Dig.* 4, tit. 4, s. 3); Commentarii, of which the seventh book is cited; and Quaestiones, of which the nineteenth book is quoted in the 'Digest' of Justinian. Celsus is mentioned by Salvius Julianus, his contemporary, and by subsequent jurists. The tendency of his juristical opinions was to the maintenance of equity and fair-dealing (bonum et aequum). His definition of 'jus' is that it is the 'ars aequi bonique,' a definition quoted with approbation by Ulpian (*Dig.* 1, tit. 1, s. 1), though it is not a true definition. Celsus said more truly that in cases in which the good and the equitable were matters for consideration, mischievous mistakes were made under the authority of legal science (*Dig.* 45, tit. 1, s. 91); an opinion which is quoted by Paulus, who calls him Celsus adolescens, apparently to distinguish him from the father.

CEMETERY. [INTERMENT, P. C.]

CENONY'CE. [LIVERWORTS, P. C. S.]

CENSORI'NUS, a Latin grammarian who lived under the emperors Alexander Severus, Maximinus, and Marcus Antoninus Pius Gordianus. This Gordianus, the grandson of the elder Gordianus, was proclaimed sole emperor of Rome A.D. 238. Censorinus is the author of a small work entitled 'De Die Natali,' addressed to Q. Caerellius, his friend. He treats of the time of the birth of men, and on the influence of the Genii and of the stars on human birth; and he also treats of other matters relating to chronology, mathematics, and cosmography. This is the work of a man who in his day was a man of learning. The style is good for the period. The work is of some value for antient chronology. Carrio in his edition considered the last part of the work, from the 24th chapter, as a separate treatise of some unknown author, and published it with the title 'De Naturali Institutione.' A treatise on accents by Censorinus is mentioned by Cassiodorus; and one on geometry is also mentioned, but both are lost. A fragment 'De Metris' is still extant.

The first edition of Censorinus is probably that of Bologna, fol. 1497. The edition of L. Carrio was published at Paris, 1585, 8vo. The edition of Haverkamp, Leyden, 8vo., 1743, was published after Haverkamp's death by his sons: it contains also the fragments of the Satires of Lucilius. The edition of 1767 is the same as that of 1743, with a new title-page. The last edition is by J. S. Gruber, Nürnberg, 8vo. 1805: the edition of 1810 has only a new title-page.

CENSORSHIP OF THE PRESS, a regulation which has prevailed in most countries of Europe, and still prevails in many, according to which printed books, pamphlets, and newspapers, are examined by persons appointed for the purpose, who are empowered to prevent publication if they see sufficient reason.

There are different modes of censorship; the universal previous censorship, by which all MSS. must be examined and approved of before they are sent to press; the indirect censorship, which examines works after they have been printed, and, if it finds anything objectionable, stops their sale and confiscates the edition, and marks out the author or editor for prosecution; the optional censorship, which allows an author to tender his MS. for examination in order to be discharged from all responsibility afterwards; and lastly, by a distinction which has been very commonly made between newspapers or pamphlets and works of a greater bulk, the censorship of the journals, which exists even in countries where larger works are free from this superintendence. All these forms of censorship imply an establishment of censors, examiners, inspectors, or licensers, as they have been variously called, appointed for the purpose, a provision quite distinct from the laws which *define the various* offences which a man may be guilty of by *publication.* These are repressive or penal laws, whilst the censorship, and especially the previous censorship, i
tially a preventive regulation.

The censorship may be said to be coeval with p
In more antient times, those writings which were o
to the prevailing political or religious systems, if t
under the eyes of men in authority, were condemne
destroyed. Thus, all the copies of the works of Pr
which could be found in Athens were publicly b
sentence of the Areopagus, because the author ex
doubts concerning the existence of the gods. Person
mation and satire were also forbidden. Naevius a
was banished, some say put in prison, for having, in hi
cast reflections on several patricians. Augustus orde
satirical works of Labienus to be burnt, and Ovid's all
probable cause of exile was his amatory poetry. Th
under Tiberius condemned a work to be burnt, in
Cassius was styled the last of the Romans. Diocletian
the sacred books of the Christians to be burnt, and aft
Constantine condemned the works of Arius to the
All these however were penal enactments independent
censorship. The councils of the Church condemned
which they judged to be heretical, and warned the
against reading them. Afterwards the popes began
demn certain works and prohibit the reading of the
the time of Huss and Wycliff, Pope Martin V. exco
cated those who read prohibited books. The introduc
printing having awakened the fears of the ecclesiasti
thorities, several bishops ordered books to be examin
censors. One of the earliest instances of this is that
by Johann Beckmann, in his 'Book of Inventions,' of
thold, Archbishop of Mainz, who in the year 1486 i
mandate, in which, after censuring the practice of tran
the sacred writings from the Latin into the vulgar Ger
language, he says, too rude and too poor to express the
meaning of the inspired text, he adverts to the translati
the books of the canon and civil law, works, as the archi
says, so difficult as to require the whole life of man
understood, a difficulty which is now increased by the i
petence of the translator, which renders obscurity still
obscure. His grace therefore, setting a full value on t
of printing, 'which had its cradle in this illustrious
Mainz,' and wishing to preserve its honour by prevent
being abused, forbids all persons subject to his auth
clerical and lay, of whatever rank, order, and professi
print the translation of any work from the Greek, Lat
any other language, into German, concerning any art, sc
or information whatever, publicly or privately, unless
translation be read and approved of before being printed,
when printed, before being published, and furnished wi
written testimony of one of the doctors and professors
University of Mainz, named by the archbishop, one for
logy, one for law, one for medicine, and one for the
All who violated this order were to lose the book, pay
of one hundred gold florins to the Electoral Chamber,
excommunicated.

Then follows the archbishop's commission to the cen
That no one in his province translate, print, or publish
book in German, unless the censors previously read an
prove its contents. And he directs them to refuse
approbation to such works as offend religion or mor
whose meaning cannot clearly be made out, and may gi
to error and scandal. To those works which they appr
they shall affix their approbation, two of them jointly, in
own handwriting.

There were works printed at Cologne in 1479 bearing
approbation of the rector of that university, and there
an Heidelberg edition of 1480 of the book entitled 'No
ipsum,' which bears four approbations, one by Philip
Doctor utriusque Juris, and another by Maffeus Gi
Patriarch of Venice and Primate of Dalmatia. There
however no general system of censorship in the fifteenth
tury, which was an age of freedom for printing; and it
curious fact that the learned scholar Merula, in a letter
friend Poliziano, dated 1480, expresses a wish that a pr
censorship should be established over all books, such as
recommends for his republic, 'for,' says Merula, 'we are
quite overcome by a quantity of bad or insignificant book

In 1501, Pope Alexander VI. (Borgia) issued a bu
which, after sundry complaints about the devil who
among the wheat, he goes on to say that having bee
that by means of the art of printing many books and tre
containing various errors and pernicious doctrines, have
and are being published in the provinces of Cologne, M

nd Magdeburg, he by these presents strictly forbids
rs, their servants, and all who exercise the art of
n any manner, in the above provinces, to print here-
books, treatises, or writings, without previously ap-
the respective archbishop, or his vicar and officials,
ver they may appoint for the purpose, and obtaining
ce free of all expense, under pain of excommunica-
es a pecuniary fine at the discretion of the respective
s, bishops, or vicars-general. The bull provides for
already printed and published, which are to be exa-
the same authorities, and those containing anything
udice of the Catholic faith are to be burnt.

in 1515, the Council of the Lateran decreed that
o books should be printed in any town or diocese,
were previously inspected and carefully examined,
by the vicar and the master of the sacred palace,
other dioceses by the bishop or those by him ap-
d by the inquisitor of that diocese or those by him
and countersigned by their own hands gratis and
lay. Any book not so examined and countersigned
burnt, and the author or editor excommunicated.
en was the origin of the principle of a general cen-
the press, which has been ever since maintained by
h of Rome in all countries where it had power to

The bishops were the censors in their respective
out the tribunal of the inquisition, wherever the in-
as established, were the censors: they examined the
ery work previous to its being printed, and granted
an 'Imprimatur' or licence at their pleasure. The
moreover sought after all books published beyond
ction, and having examined their contents, con-
ose which were contrary to the doctrine or discipline
rch of Rome, and of these it formed a list known
me of Index of Forbidden Books, to which it has
ious additions from time to time. There are
these Indices, made at different times and in differ-
: the Index of the Spanish Inquisition was different
of Rome. Collections of these Indices have been
ne of the latest is contained in the 'Dictionnaire
t Bibliographique des principaux Livres condamnés
pprimés ou censurés,' by Peignot, Paris, 1806. In
here the inquisition was not established, such as
ngland, and Germany, the bishops acted as censors
rs of books, which they examined or caused to be
previous to printing, as to all matters concern-
n or morality. The censorship continued for a
to belong to the ecclesiastical power, and even
, when the civil power in various countries began to
al censors to examine all kinds of works, the epis-
obation was still required for all books which
religion or church discipline.

formation greatly modified the censorship and re-
owers, without however abolishing it; the power
other hands. In England the practice seems to have
point licensers for the various branches of learning,
hops monopolized the principal part of the licensing
we find at the beginning of the reign of Charles I.
n of the printers and booksellers to the House of
complaints against Bishop Laud that the licensing
being wholly confined to him and his chaplains, he
oks which favoured Popery to be published, but re-
sing those which were written against it. And
p Abbot observed of Laud's licensing, 'it seemed
d an expurgatory press, though not an index like
ists, for the most religious truth was expurgated and
l in order to the false and secular interests of some of
.' The system of previous licensing however did
secure an author from subsequent responsibility.
nne's 'Histriomastix' was condemned in 1633 to be
the hangman, for being a satire on the royal family
nment, and the author to have his ears cut off, and
prisoned and heavily fined, although the book had
een licensed, but it was alleged on the trial that the
d not read the whole of the work.

ee of the Star Chamber concerning printing and
dated 11th of July, 1637, was issued in order
h a general system on the subject. The pre-
fers to former decrees and ordinances for the
ernment and regulating of printers and printing,
ularly to an order of the 23rd of June, in the 28th
lizabeth, 'which orders and decrees have been
xperience to be defective in some particulars, and
llous, seditious, and mutinous books, have been

unduly printed, and other books and papers without licence. The decree enacts among other things that 'no person or persons shall at any time print or cause to be printed any book or pamphlet whatsoever, unless the same book or pamphlet, and also all and every the titles, epistles, prefaces, proems, preambles, introductions, tables, dedications, and other matters and things whatsover thereunto annexed, or therewith imprinted, shall be first lawfully licensed and authorised only by such person and persons as are hereafter expressed, and by no other, and shall be also first entered into the register's book of the Company of Stationers, upon pain that every printer offending therein shall be for ever hereafter disabled to use or exercise the art or mystery of printing, and receive such further punishment as by this Court or the High Commission Court respectively, as the several causes shall require, shall be thought fitting.' It then goes on to provide that all books concerning the common laws of the realm shall have the special approbation of the Lord Chief Justices and the Lord Chief Baron for the time being, or one or more of them, or by their appointment; that all books of history or any other book of state affairs shall be licensed by the principal secretaries of state, or one of them or by their appointment; and that all books concerning heraldry, titles of honour and arms, or otherwise concerning the office of earl marshal, shall be licensed by the earl marshal, or by his appointment; 'and further that all other books, whether of divinity, physics, philosophy, poetry, or whatsoever, shall be allowed by the Lord Archbishop of Canterbury or Bishop of London for the time being, or by the chancellors or vice-chancellors of either of the universities of this realm, for such books that are to be printed within the limits of the universities respectively, not meddling either with books of the common law or matters of state. And it is further enacted that every person and persons, which by any decree of this court are or shall be appointed or authorised to license books or give warrant for imprinting thereof, as is aforesaid, shall have two several written copies of the same book, one of which shall be kept in the public registry of the respective licenser, to the end that he may be secure that the copy so licensed shall not be altered without his knowledge, and the other copy shall remain with the owner, and upon both the said copies he or they that shall allow the said book shall testify under his or their hand or hands, that there is nothing in the book contrary to the Christian faith and the doctrine and discipline of the Church of England, nor against the state or government, nor contrary to good life or good manners, or otherwise, as the nature and subject of the work shall require, which testimony shall be printed in the beginning of the book with the name of the licenser. All books coming from beyond the seas were to be reported by the merchant or consignee to the Archbishop of Canterbury or the Bishop of London, and to remain in custody of the custom-house officers until the Archbishop or Bishop sent one of their chaplains or some other learned man to be present with the master and wardens of the Company of Stationers or one of them, at the opening of the bale or package, for the purpose of examining the books therein contained. And if there is any seditious, schismatical, or offensive book found among them it was to be brought forthwith to the Archbishop of Canterbury or the Bishop of London, or to the High Commission Office, to be dealt with accordingly. All books, ballads, charts, and portraits were to bear the name of the printer or engraver as well as of the author or maker. All printers were to take out a licence. Their number was fixed and their names were published.

The war between Charles I. and the Parliament, and the abolition of the royal authority, did not affect the censorship, and the Long Parliament in the plenitude of its power maintained the practice just as the Star Chamber had done.

In March, 1642, an order of the Commons House of Parliament appointed by name certain stationers of London to search for any lying pamphlets scandalous to his majesty, or the proceedings of both or either House of Parliament, demolish and take away the printing-presses, and apprehend the printers or sellers.

In June, 1643, was issued an order of the Lords and Commons assembled in parliament for the regulating of printing, and for suppressing the great late abuses and frequent disorders in printing many false, scandalous, seditious, libellous, and unlicensed pamphlets, to the great defamation of religion and government. It enacts that no book, pamphlet, paper, nor part of any such book, pamphlet, or paper, shall from henceforth be printed, bound, stitched, or put to sale by any person or persons whatsoever, unless the same be first approved of and licensed under the hands of such person or persons as both or either of the Houses of Parliament shall appoint for the licensing of the same, and entered into the register-book of the Company of Stationers, according to antient custom. And further on it authorizes or requires the master and wardens of the said company, the gentleman usher of the House of Peers, the sergeant of the Commons' House and their deputies, together with the persons formerly appointed by the committee of the House of Commons for examination, to make from time to time diligent search in all places where they shall think meet, for all unlicensed printing-presses, and all presses any way employed in the printing of scandalous or unlicensed papers, pamphlets, books, &c., and to seize, deface, and destroy the same in the Common Hall of the said company.

It was in consequence of this order that John Milton wrote his 'Areopagitica; a Speech for the Liberty of unlicensed Printing,' addressed to the parliament of England, in which he shows that the system of licensing originated with the Papal Inquisition, and that it ought not to be adopted by a Protestant community: he exhibits its uselessness and injustice, and observes that the order of parliament is only a revival of the former order of the Star Chamber. Milton's disquisition is a piece of close reasoning and eloquently written, but it had no effect upon parliament, which continued to sanction the restraints upon the press, even after the abolition of royalty. A warrant of the Lord-General Fairfax, dated 9th of January, 1648, and addressed to 'Captain Richard Lawrence, Marshal-General of the Army under my command,' in virtue of an order of parliament, dated 5th of January, 1648, to put in execution the ordinances of parliament concerning scandalous and unlicensed pamphlets, and especially the ordinance of 28th September, 1642, and the order of the Lords and Commons, dated 14th June, 1643, for the regulating of printing. The marshal-general of the army is 'required and authorized to take into custody any person or persons who have offended or shall hereafter offend against the said ordinances, and inflict upon them such corporal punishments, and levy such penalties upon them for each offence, as is therein mentioned, and not discharge them till they have made full payment thereof, and received the said punishment accordingly.' And he is further authorized and required to make diligent search 'from time to time, in all places wherein he shall think meet, for all unlicensed printing-presses any way employed in printing scandalous and unlicensed papers, pamphlets, books, or ballads, and to search for such unlicensed books, papers, treatises, &c.'

The parliament of 1654 appointed a committee to watch all blasphemous publications, on whose reports several books, religious or controversial, were ordered to be burnt.

The parliament of 1656 appointed a committee to consider the way of suppressing private presses and regulating the press, and suppressing and preventing scandalous books and pamphlets. The Protector Cromwell enforced these restraints in order to prevent the agitation of political questions. In October, 1653, the council at Whitehall ordered that no person shall presume to publish in print any matter of public news or intelligence, without leave and approbation of the secretary of state. There appeared also an order of the protector and council against printing unlicensed and scandalous books and pamphlets, and for regulating printing. Cromwell however was disposed in general to rescue the victims of religious intolerance from the hands of their persecutors, the Independents and the Presbyterians.

After the Restoration, Roger Lestrange was appointed licenser of printing. He wrote in 1663, 'Considerations and Proposals in order to the Regulation of the Press.' Lestrange seems to have retained his office till the revolution of 1688, when he was succeeded by Fraser, who, it was said, was shortly after removed from his office for having allowed Dr. Walker's 'True Account of the Author of Eicon Basilike' to be printed. Edmund Bohun, a Suffolk justice, was appointed in Fraser's place. In a pamphlet printed in London in 1693, entitled 'Reasons humbly offered for the Liberty of Unlicensed Printing; to which is subjoined the just and true Character of Edmund Bohun, the Licenser of the Press, in a Letter from a Gentleman in the Country to a Member of Parliament,' there is a specimen of Bohun's licences: 'You are hereby allowed to print and vend a certain book, entitled . . . ., and for so doing this shall be your sufficient warrant. E. B.'

The act passed under Charles II., in 1662, which was, *with few alterations*, a copy of the Parliamentary ordinances
concerning the licensing of printing, expired
was revived by statute 1 Jac. II. c. 17, and co
1692. It was then continued for two years longe
4 William and Mary, c. 24, and it expired in
the licensing system was finally abolished in En
the question of its revival was repeatedly agita
liament, as we see by a paper dated 1704, entitle
against restraining the Press,' which deprecates th
of reviving the licensing system; and by a muc
bolder pamphlet dated 1729, styled, 'Letter to a
concerning the Liberty of the Press.'

Under the old French monarchy, all works
being printed were to be examined by the roy
and if approved, were signed with their
The French censorship was originally in the ha
bishops, for all matters concerning religion and
discipline. By degrees the bishops delegated th
the faculty of theology, and the Parliament of
tioned the practice. The manuscripts were laid
faculty, which appointed two doctors of divinity
them. The doctors made their report to the gene
of the faculty, which approved or rejected the wo
themselves were not exempt from this formality.
Cardinal Sadoleto, while Bishop of Carpentras,
permission to print a commentary which he had
the Epistle of Paul to the Romans in 1532: Card
was likewise refused permission to publish a w
As at that time a number of heterodox books w
into France from abroad, the Parliament of Paris
sion of the year 1542, authorised the faculty of
examine all books imported from foreign countries.
the beginning of the following or seventeenth centu
increase and accumulation of new books having
examining doctors to omit their reports to the ass
faculty, the assembly issued an order to the said
not to give their approbation to new works with
consideration, under the penalty of suspension
office. In 1624 the faculty itself being divided
on some matters of controversy, Dr. Duval, the l
of the parties, obtained the king's letters patent
and three of his colleagues, by which they obtai
clusive authority of approving all books concern
and church discipline. The faculty remonstrated
innovation, but the king maintained his appointm
Duval's death, the faculty resumed its old pow
1653, the controversy concerning grace having gi
a multitude of polemical works, concerning which
itself was divided in opinion, the chancellor S
from it the censorship: and he created four cens
annual stipend, to examine all works without disti
fore that time it appears that works unconnected w
were examined by the Maîtres des Requêtes. But
1653, the appointment of the censors rested with
cellor. They were styled Royal Censors, and th
was gradually increased. They were distributed
classes, according to the nature of the works whic
to examine, namely, theology, jurisprudence, nat
and medicine, surgery, mathematics, history and b
(which class had the greatest number of censors
it); and lastly, geography, navigation, travels, and
No work could be printed or sold unless it was
examined and approved by one of the Royal Cen
lieutenant of police had under him a censor who e
dramatic works, before they could be performed.

At the Revolution the censorship was abolis
republican constitutions which were proclaimed in
acknowledged the principle of the liberty of the
amidst the struggle of parties, that principle was
looked, and journals and other works obnoxious to
faction of the day were seized, and the authors or
prisoned and transported. Throughout the whole
the so-called French republic, liberty existed in na
in reality; and it was the experience of this that m
acquiesce in Bonaparte's dictatorship. After the
of Brumaire, when Bonaparte was proclaimed Firs
the French Republic, with powers more extensive
of most kings, the question of the press attracte
attention. He said one day in the Council of Sta
character of the French nation required that the li
press should be limited to works of a certain si
newspapers and pamphlets ought to be subject t
inspection of the police. No censorship was est
the Consular constitution, but the newspaper pres

nercy of the executive. By a decree of the 27th Nivose,
, the number of newspapers at Paris was fixed, and the
rs were forbidden to insert any article ‘derogatory of the
ct due to the institutions of the country, the sovereignty
e people, and the glory of the French armies,’ or offen-
o the governments and nations which were the friends
llies of France, even if such articles should be extracted
foreign journals, under pain of immediate suppression.
Moniteur was announced to be the only official journal.
Ami des Lois was suppressed on the 3rd Prairial, 1800,
der of the Consuls on the report of Lucien Bonaparte,
ster of the Interior, for having thrown ridicule on the
bers of the Institute. Under such discipline the number
bscribers to the newspapers of Paris dwindled rapidly
50,000 to less than 19,000, and the Moniteur inserted
statement as a subject of congratulation. The Minister
e Interior had the censorship of dramatic compositions
re they could be brought on the stage.

apoleon was not friendly to liberty of any kind, and still
to that of the press. He felt very sore at the gibes and
sms of the English journals, which he had translated to
; and he insisted that no word, however offensive, should
mitted. When the organic law was discussed in the
te, which was to declare him Emperor, some one spoke
uarantees to be given to the nation, and mentioned the
rty of the press among the rest. Napoleon contented
self with appointing a committee in the Senate with the
inal office of protecting the liberty of the press, which
both a misnomer and a sinecure.

n 1806 there appeared an instance of renewed book-
nsing. A drama of Collin d'Harleville, making part of
series of his works, bore the following licence: ‘Seen
allowed to be printed and published, by decision of his
cellency the Senator Minister of the General Police, dated
Prairial, year XIII. By order of his Excellency the chief
the department of the liberty of the press, P. Lagarde.’
e Journal of the Empire inserted this novel document in
columns; upon which the official Moniteur observed, in a
of ill humour, that the emperor had been surprised to
n that an estimable writer like M. d'Harleville should
d permission to publish a work bearing his name; that
e existed no censorship in France; that any French
en could publish any book that he thought proper,
g responsible for its contents before the tribunals,
pursuant to a decree of his Majesty, if charged with any
g derogatory from the power of the emperor and the in-
sts of the country.

n Napoleon's kingdom of Italy the censorship was like-
e declared to be abolished, but on the day of the publica-
of a work two copies were to be deposited at the office
the Minister of the Interior. A commission, styled
ewise ‘of the liberty of the press,’ examined the book and
de its report to the Minister, who, if he saw reason,
pped the sale of the work, and ordered the author or
ter to be arrested and tried. Those who wished to avoid
h risks, were allowed to lay their MS. before the commis-
n, which returned it with such corrections or suppressions
it thought advisable. This was called the facultative or
ional censorship.

At last, in 1809-10, the project of a definitive law con-
ing the press in France became the subject of frequent
ssions in the Council of State, in which Napoleon took a
t. ‘I conceive,’ said he, ‘the liberty of the press in a
ntry where the government is acted upon by the influence
the public opinion, but our institutions do not call upon the
ple to meddle with political affairs; it is the business of
Senate, the Council of State, and the legislative body, to
k, speak, and act for the people, and the liberty of the
s would not be in harmony with our system, for the mani-
tation of the power of public opinion would only be pro-
tive of disturbance and confusion.’ On the question of
censorship the more liberal councillors of state argued in
ur of the optional censorship, by which authors who of
r own accord laid their works before the censors, should
relieved from further responsibility after publication.
ose councillors who were for a previous and obligatory
rship, such as Cambacérès, Molé, Pasquier, Portalis, and
nier, maintained that writing for publication was a species
aching, and that in a country like France, where public
ruction was so organised and regulated as not to be per-
ted to spread any dangerous doctrine, it would be incon-
ent to allow writers to assume uncontrolled the mission of
ching whatsoever they pleased. No mode of teaching or influencing the public mind ought to escape the vigilance of the authority of the state. Under every government, those who addressed publicly a certain number of persons were watched; *à fortiori*, those who by their writings addressed themselves to all men, ought to be watched also. It had been said erroneously that the right of publishing was a natural faculty; the art of printing is a social invention, and as such is subject, like all other inventions, to administrative regulations in order to prevent its being abused. Without the previous censorship, the suppression of a mischievous book after publication came too late.’ (Sittings of the Council of State of the 11th and 25th of October, 1809, in Thibaudeau, *Histoire de la France et de Napoléon*, ch. 67.) Napoleon was not for the obligatory and previous censorship, because it might find itself placed in an awkward dilemma, especially with regard to certain books which appeared to have a sceptical or heterodox tendency. He preferred the optional censorship, leaving however to the proper authorities the power of stopping the printing or seizing the printed copies of any work which they thought dangerous. He was inexorable towards offences against the state. The decree of February, 1810, which was the result of these discussions, appointed a director-general of the press, with auditors, inspectors, and censors, under the control of the Minister of the Interior. The number of printers was to be fixed in every department; sixty was the number fixed for Paris: printers as well as booksellers were to take licences and swear fidelity to their country and the emperor. Printers were forbidden to print anything derogatory of the duties of subjects towards their sovereign, or of the interests of the state. Parties offending were to be brought before the courts, and punished according to the Penal Code; besides which the Minister of the Interior had the right of depriving the printer of his licence. Before setting up a work, the printer was to transmit the title of it, with the name of the author, if known, to the director-general, and likewise to the prefect of the department, declaring his intention to publish the work. The director-general could, if he chose, ask for the MS., and send it to one of the censors for examination. After the censor had made his report, the director would point out such alterations or suppressions in the text as he thought proper, and which became obligatory upon the author or printer, who however had the right of appealing to the Minister of the Interior, who forwarded the MS. to another censor, who made his report to the director-general, and the director-general, assisted by other censors, decided finally upon the matter.

Authors or printers had the option of submitting their MSS. to the examination of the censors previous to printing. But even after being examined, approved, and printed, a work could be seized and its sale stopped by the minister of police, who was however to forward it with his remarks, within twenty-four hours, to the Council of State, which judged finally upon it. A well-known instance of this occurred with regard to Madame de Staël's book on Germany, which was seized after having been examined and printed, and the whole edition was destroyed. ‘Your book is not French, and we are not reduced to seek for models among the nations which you admire,’ was the minister of police's (Savary's) reply to Madame de Staël's remonstrances on the subject.

Books printed abroad could not be imported into France without permission from the director-general.

The police had the censorship of dramatic works intended for the stage. Only one newspaper was allowed in each department, with the exception of Paris, subject to the approbation of the respective prefect. Such was the condition of the press in France during the latter years of Napoleon's empire.

At the first restoration of the Bourbons, in 1814, an article of the Charter of Louis XVIII. acknowledged that ‘Frenchmen had the right of publishing their opinions by means of the press, conformably however to the laws enacted for the repression of any abuse of the liberty of the press.’ Soon after, the Abbé de Montesquiou, Minister of the Interior, laid before the chambers the project of a law concerning the press, the effect of which would have been nearly to destroy its freedom. He proposed that all works of less than thirty sheets were to be subject to a previous censorship (*censure préalable*), excepting those in the dead or foreign languages, bishops' charges, pastoral letters, and catechisms and prayer-books, and memoirs of literary and scientific societies. This project was examined by a commission of the chamber, which rejected in its report the previous censorship. The article eight of the charter said that the law should *repress* the abuse of the liberty of the press, but the ministerial project by its previous censorship tended to *prevent* it by suppressing the liberty altogether. The discussion was warm. Montesquiou maintained that to prevent and to repress were synonymous. He at last agreed to exempt from the previous censorship all works of twenty sheets and above, instead of thirty. With this modification the bill passed both houses by considerable majorities. A council of twenty censors was appointed. The office of director-general of the press was retained. Every printer was obliged to give notice of each work that he intended to print, and to deposit two copies of it, when printed, at the director's office, before he published the work.

When Napoleon returned from Elba, in 1815, he did not enforce the previous censorship, because, said he, they had published whatever they pleased against him under the Bourbons, and the matter was now exhausted. The other regulations however concerning printing and publishing were maintained, and the press and the emperor were often at variance during the hundred days. The previous censorship was temporarily re-established and abolished again under the second restoration of Louis XVIII. After Charles X. came to the throne, he abolished the previous censorship altogether, and by so doing he gained a momentary popularity with the Parisians. But the press, and especially the newspaper press, did not show any great extent of gratitude for the boon, for it proved throughout his reign a sharp thorn in his side, as may be seen by the famous report of his ministers, upon which report the ordinances of July, 1830, were based. That report was attributed to M. Chantelauze, the keeper of the seals, but it was signed by all the ministers. It contains an able, an eloquent, and, in the main, a true exposition of the crafty and persevering course of conspiracy by which the press was constantly exciting or feeding a determined hostility towards the king and his government, casting suspicion upon and misrepresenting all their acts, even those which were evidently beneficial and liberal, because they proceeded from persons whom the press itself had rendered unpopular, appealing to the passions and prejudices of a susceptible and uninstructed multitude, and thus rendering, in fact, government impossible. This report is a very interesting historical document, and ought to be read by those who wish to form a dispassionate judgment of the press, and its powers for good and evil. 'At all times,' said the minister, 'the periodical press had been, as it was in its nature to be, an instrument of disorder and sedition.' Accordingly the first of the ordinances of Charles X., signed the 25th of July, suspended the liberty of the periodical press; no journal was to be henceforth published without a special authorization of the government, which was to be renewed every three months. All pamphlets or works under twenty sheets of letter-press were made subject to the same authorization. The ordonnances however were resisted, and the revolution of July was the result. The revised charter which was afterwards promulgated, 'Charte de 1830,' in its seventh article, says: 'Frenchmen have the right of publishing and printing their opinions, conformably to the laws. The censorship shall never be re-established.' New laws however were enacted to repress the abuses of the press, among which the law of the 9th of September, 1835, is, we believe, the latest. It embodies or refers to many of the former laws of the Empire and the Restoration. It specifies the crimes and misdemeanors committed by means of the press, and assigns the penalty to each. The proprietors of political journals are obliged to deposit a considerable sum in the treasury as a security for their good behaviour. One hundred thousand francs (four thousand pounds sterling) is the deposit required for a daily Paris newpaper, and one half the sum for a weekly paper.

There is a material difference, in all the constitutions which have been framed for France and for other countries on the model of France, between the abstract constitutional principle, such as liberty of the press, individual liberty, &c., and its application, as modified by the various codes of laws, which are chiefly those of Napoleon. However, the press is certainly more free in France than it was under Napoleon or the old monarchy, but it is still far from having attained the wide uncontrolled freedom of the press in England, which may be truly said to be the freest in the world. The surest method of convincing oneself of this would be to pick out two or three of the more ultra-liberal English or Irish papers and examine them according to the existing laws in France, which constitute what is called the 'Code de la Presse,' noticing how *often they would* be found to have offended against the pro*visions of that* code, and what penalties they would have incurred for each offence. The penalties in the French c of the press are very severe.

The absolute monarchies of Europe, Russia, Austria, Prus and the Italian States retain the obligatory previous censors of the press, which is derived from the very principle of th government, that of parental authority over their subjects. some of the Italian States there is a double censorship; o by an ecclesiastical and the other by a political censor. B even then it happens sometimes that after a work has pas the censorship and obtained the 'imprimatur,' something o noxious is discovered which had escaped the censor's penet tion, and the book is seized and confiscated.

In the republics of Switzerland, the censorship exis before the organic changes which have taken place in mos the cantons since 1830. All previous censorship is now ab lished, but the laws in some of the cantons are very restric of the liberty of the press, and especially of the newspap press, on matters of religion. Generally speaking the pres freest in the Protestant cantons.

By the last Spanish constitution, of 1837, art. 11, 'a Spaniards may print and publish their thoughts fre without previous censorship, but subject to the laws. The d termination of offences by means of the press belongs exc sively to juries empannelled for that purpose.'

The constitution of Portugal establishes no previous ce sorship, but refers to the laws for repressing the abuses of t press.

By the constitution of the kingdom of Greece of 18 'the Hellenes have the right of publishing freely th thoughts by means of the press, abstaining however—1, fr attacking the principles of the Christian religion; 2, offen ing decency and morality; 3, indulging in personal insult a calumny.'

The Swedish constitution of 1809, promulgated under Kin Charles XIII., enacts that the states of the kingdom in eve new Diet shall appoint a committee of six members, well i formed persons, among whom must be two jurists, for th purpose of maintaining the liberty of the press. The com mittee will examine all MSS. which shall be laid before it by any author or bookseller, and if the committee declares th the work is fit to be printed, the author and publisher ar thenceforth discharged from all further responsibility. The Chancellor of Justice of the State is by right President of the Committee. But this is a voluntary and not an obligatory previous censorship. By a former resolution of the Diet of 1778, books of controversy which attack the established religion (the Lutheran or Augsburg Confession) or support the tenets of other communions, are excluded from the liberty of the press. Persons guilty of libel and other offences by mean of the press are tried by a jury. By a law enacted by the Diet in 1812, a newspaper which insults or defames a forei- government friendly to Sweden, is liable to be suppressed by order of the chancellor, without any other formality. This has occurred repeatedly, but then the paper appears again the next day under a slightly altered title; for instance, the Argus is suppressed, but is continued under the title of Argus II. or Argus III.

The constitution of Norway proclaimed in the Storthing of Eidswold, November, 1814, enacts that no one shall be prosecuted for his printed writings, unless he wilfully and evidently manifests or encourages others to manifest disobedience to the laws, contempt for religion, morality, or the constitutional powers, or resistance to the constitutional authorities, or is guilty of defamation and libel against any one, in which case he shall be fined by the tribunals.

The constitution of the Netherlands of 1815, which is sti in force in the kingdom of Holland, says, art. 227, 'the pre being the fittest means to spread knowledge, every one has a right to make use of it to communicate his thoughts, without needing previous permission. But all authors, printers, editors, or publishers, are answerable for those writings which attack the rights either of society or of individuals.'

By Art. 18 of the constitution of Belgium the press is declared to be free; no censorship can ever be establi Authors, editors, and printers are not required to give sec Offences committed through the press are tried by the nary courts.

In Denmark, an ordinance of Christian VII., dated tember, 1799, on the subject of the press, abolishes previous censorship, but imposes severe penalties on those offend through the press; death is the penalty for any pe who shall excite rebellion or provoke a fundamental change in the constitution of the monarchy. Whoever censures or der excites hatred or contempt against the constitution ingdom and the government of the king, either on grounds or on the occasion of any particular act, shall shed for life, and if he returns without permission, sent to hard work for life. Whoever shall censure the monarchical form of government in general shall l from three to ten years. Any libel against the person our of the king, or any member of the Royal family, shall hed with exile. Whoever publishes a work tending the existence of God, or the immortality of the soul, it censure or ridicule on the fundamental dogmas of istian religion, is to be banished likewise. Any one ll attack or ridicule the tenets of the other Christian ions tolerated in the kingdom, shall be punished by a prisonment on bread and water. The same punish- assigned to those who shall offend public morals : writings. Any one defaming a foreign prince to Denmark, or ascribing to his government any un- disgraceful act, without quoting any authority, shall to hard work in a house of correction for a limited

liberty of the German press, or the thing so called, a former times according to the spirit of the different ients. As long as the emperors of the house of were under the influence of the Jesuits, they tried to . certain rules in order to check the press equally all empire, and an imperial commission was appointed, it at Frankfort on the Main, to watch over the pro- of a host of authors. The states of the empire showed little deference to imperial orders; many of owed the press nearly complete freedom; and Saxony remost among them, the booksellers ceased to assemble :fort, and chose Leipzig for the centre of their exten- e, which it has remained ever since. King Frederick russia granted liberty to the press 'because it amused ut he cautioned the editors of newspapers 'to act cum lis, and especially not to give offence to foreign states.' sorship was abolished in Bavaria in 1803; in Hesse klenburg it existed only occasionally; and in Holstein s had always been free; but these were exceptions, most of the Roman Catholic states, especially in the press was most arbitrarily checked. The great s of the German nation to put down the power of n and re-establish most of their petty princes on their seemed to deserve some reward, and the princes con- y promised, in Art. 18 of the Act of Confederation, e diet should occupy itself in its first meeting with eneral rules concerning the press in Germany.' The hought that such rules would be in favour of the f the press, but it soon became manifest that they eatly mistaken in forming such sanguine hopes. of the minor states however abolished the censor- Nassau in 1814, Würtemberg in 1815, and Saxe- in 1816. The political agitation of Europe after nfall of Napoleon, and the desire of a new order s, which seemed to take the same turn in Germany ain and Italy, caused the German rulers to hold a at Karlsbad in 1819, by which the German periodi- s was enslaved by the decision that all books or other publications under twenty sheets should be subjected sorship. The spirit which directed this censorship it arbitrary and harsh, and led to collisions of the igerous kind between the representative bodies of the d the rulers. Nor was the liberty of the press for bove twenty sheets respected, and political authors ly experienced many persecutions, while strangely religious matters might be treated with perfect freedom. French revolution in 1830 produced most salutary n Germany. The people rose in arms, demanding tional rights, and above all a free press, and the rulers some states compelled to grant their claims. In § 37 iew constitution of the electorate of Hesse, it is said press and the book trade shall enjoy complete liberty, t the censorship shall only exist in cases specified by . Similar laws were made in the kingdoms of Saxony nover, in Brunswick and most of the minor states. st liberal regulations for the press were obtained by mbers of the grand duchy of Baden, in December, out the fear of the French revolutionists having then l, the laws of Baden as to the press were declared by , in 1832, to be contrary to the general law (the f Karlsbad of 1819), and the press in Baden was once slaved. On the 28th of June, 1832, the diet resolved that care should be taken to compel the editors of newspapers and other political productions to keep within proper limits in publishing the debates of the representative bodies, and the diet of 1836 declared that editors of newspapers and political writers should publish no accounts of such debates except those published in the government papers, or extracts from them. Since that time there has been a visible reaction against the freedom of the press, though the censorship is much more severe against political and historical publications than against other works. It was hoped that the present king of Prussia, who manifested very liberal sentiments when his kingdom was threatened with a French invasion, would grant a free press; but that fear having ceased in 1841, the king gave fresh orders to adhere strictly to the decree of Karlsbad, so that now only books above twenty sheets are exempt from the censorship. There are however plenty of means in Prussia, as well as in the rest of Germany, for preventing authors from publishing works of a tendency contrary to the views of its government; for nearly all men of scientific attainments being in the service of government, expose themselves to dangerous consequences unless they act as Frederick the Great recommended, 'cum grano salis.' A proof of the influence of the government in this respect is the strange change in the spirit of so many Prussian authors since the accession of the present king. Previous to this event the worship of the philosophy of Hegel was almost necessary for obtaining places under government: the present king however was known to be opposed to Hegel, and no sooner was he king than Hegel was abandoned by most of his disciples, and those who stuck to him were attacked without mercy. Great numbers of Prussian authors who were not known for their piety before the king's accession, became known for it after. The only country where the press was free, in spite of the decrees of the diet, was the duchy of Holstein, as mentioned above; and the most liberal German works were printed and issued by the publishers at Altona; but since the dissensions between the German and the Danish populations of the kingdom of Denmark, the periodical press in that duchy has been enslaved to such a degree that even suspicious music has not passed the scissors of the censors, as we read in one of the last numbers of the 'Hamburger Correspondent.'

In the political systems prevalent in Germany, censorship is one of the various functions of the police, a word which among the German theorists has a much larger meaning than we are accustomed to give to it. The direction of the censorship was accordingly in the hands of the ministers of police. The present king of Prussia however established an Ober-Censur-Behörde, or a commission charged with the direction of the censorship and the superintendence of the different censors in the provinces. A similar arrangement was lately made in Austria: the censorship was taken from the minister of police, and intrusted to a commission, as in Prussia, which is under the control of the minister of the interior.

(*Conversations-Lexicon*, *Supplement*, Art. *Pressfreiheit*; Lesur, *Annuaire*; Venturini, *Chronik des Neunzehnten Jahrhunderts*.)

The Constitutions of the various States composing the North American Union, admit the absolute liberty of the press. There is of course in each State a law of libel, sufficiently strict, concerning which it may be entertaining to read Cobbett's account of his own trial, entitled 'A Republican Judge,' under the assumed name of Peter Porcupine. In the slave States there are very severe laws against interfering by the press with the great question of slavery. It has been stated that abolitionist newspapers are seized at the post-office.

The republics of Spanish America likewise acknowledge the principle of the unfettered liberty of the press, however it may have been often violated in practice amidst the never ending factions and civil wars of those countries. The constitution of the Brazilian Empire establishes the freedom of the press without any censorship; but an author is liable to punishment in such cases as are provided by law.

(Beckman, *History of Inventions*; Burton, *Diary*; *Encyclopédie Méthodique*, section 'Jurisprudence,' art. 'Censure des Livres;' Thibaudeau, *Histoire de la France et de Napoleon Bonaparte*; Bacqua, *Codes de la Législation Française*, 1843; *Collection de Constitutions et Chartes*, by A. Dufau, etc. Paris, 1830; and the other works and pamphlets quoted in the course of this article.)

CENSUS OF 1841. In June, 1841, was taken the decennial census of Great Britain and Ireland, the results of which.

when compared with other statistical returns, afford the means of examining the condition and prospects of the country. It is not proposed, in this article, to enter with any minuteness either upon the manner in which the census was taken, or upon the detailed results appearing in the reports of the commissioners; but it is intended to present a comparison of the increase and distribution of the population, with their means of employment, their command of the necessaries and conveniences of life, the growth of capital, the extension of trade and manufactures, and with other indications of the progress of society. If it shall appear that in all these respects the means of enjoyment have increased more rapidly than the population, this review of the national resources will be most encouraging; and may be more generally acceptable than a tedious examination of the specific results of the census itself. As the selection of the various subjects of comparison will be made without reference to any preconceived theory, the accuracy of the facts may be relied on; and it is hoped that no conclusions will be drawn from them which they do not fairly justify.

In several particulars, it will be necessary to advert to Great Britain and to Ireland separately; but it will be convenient, in the first place, to present a summary of the population of the United Kingdom in 1831 and in 1841, with calculations of the rate of increase per cent.

	1831.	1841.	Increase per cent.
England . . .	13,091,005	14,995,138	14·5
Wales	806,182	911,603	13
Scotland . . .	2,365,114	2,620,184	10·7
Army, navy, and registered seamen afloat	277,017	188,453	..
Persons travelling on the night of June 6	..	5,016	..
Islands in the British Seas . . .	103,107	124,040	19·6
Great Britain . .	16,643,028	18,844,434	13·2
Ireland	7,767,401	8,175,124	5·25
United Kingdom .	24,410,429	27,019,558	10·6

The Irish census commissioners (Report, p. xi.) enter into certain calculations, by which they raise the per centage of increase in the population of Ireland from 5·25, as actually shown in the returns, to nearly 12 per cent. If the same principles of calculation were applied to the population of Great Britain, the increase would also be greater; but it will be sufficient, for the purposes of this inquiry, if the entire population of the United Kingdom, during the ten years from 1831 to 1841, be assumed to have increased 12 per cent.

In judging of the condition of the people, the first point which may be investigated is their consumption of those articles which are used more or less in proportion to their means. Unhappily there are no means of estimating the quantities of bread and meat or other staples of food produced in this country; but the quantities of auxiliary articles of food and luxury imported from abroad for home consumption, or manufactured in this country, are fair indications of the means possessed by the people of enjoying the comforts of life. If the increase in the consumption of such articles be in a greater proportion than the increase of population, it may reasonably be inferred that their means of enjoyment have generally increased; or, in other words, that the people enjoyed comforts in 1841 than in 1831, relatively to their numb

The quantities of several articles which paid duty fo consumption in the United Kingdom, in 1831 and 1 spectively, and the rate of increase, will appear from t lowing table:—

		1831.	1841.	R c in
Butter . .	cwts.	121,193	251,255	1
Cheese . .	„	130,039	248,335	
Cocoa . .	„	502,806	1,930,764	2
Coffee . .	lbs.	22,715,807	28,420,980	
Tea . . .	„	29,997,055	36,396,078	
Rice . . .	cwts.	140,100	245,887	
Eggs . . .	No.	58,464,690	91,880,187	
Tallow . .	cwts.	918,733	1,243,112	
Soap (hard)	lbs.	108,956,030	156,008,290	
Tobacco . .	„	19,333,840	22,308,385	
Crown-glass .	cwt.	103,803	116,895	
Plate-glass .	„	14,019	27,639	
Bottle glass .	cwts.	288,760	499,581	
Paper . .	lbs.	62,738,000	97,103,548	

This list might be extended much further; but it w fice to show that the consumption of these articles (res in some cases by too heavy a taxation) was enjoyed in a ratio than the increase of population, and that the com the people must have been proportionately greater in 18 in 1831.

Concurrently with this increased consumption of arti comfort and luxury, it is worthy of special notice that of intoxicating drinks had apparently decreased. We aware of any causes which encouraged the smuggling o teration of spirits in 1841 which did not exist in 1831 yet it appears, from the returns, that the consumption o paid spirits of all kinds, whether British or foreign, h creased in that interval to the extent of 7·8 per cent. same period the consumption of all wines had increase 3·9 per cent. The consumption of beer cannot be ascer but the quantity of hops that paid duty had fallen 36,500,028 lbs. in 1831, to 30,504,108, or 19·6 per and of malt, from 40,334,987 bushels to 35,656,713, o per cent. From these facts, however, no certain inf can be drawn, on account of the great varieties in the produce of these articles in different years, and of the fr of other ingredients by brewers.

Our view of the evidences of increased consumptio be closed by the notice of the three articles of timbe ton, and wool, all of which are used solely in givin ployment to productive industry. Taking all the di kinds of imported timber, there appears to have been crease of 37·5 per cent. In cotton-wool there was an in of 61·1 per cent.; and in sheep and lambs' wool import 78·7 per cent.

The next subject of comparison may be the expo British and Irish produce and manufactures from the Kingdom, in 1831 and in 1841, from which the manu ing and commercial condition of the country, and the e ment of its people, at those periods, may be collected.

The quantities and declared value of some of the pri articles of export are exhibited in the following table:—

Exports from the United Kingdom.

		1831.		1841.		Increase per cent.	
		Quantities.	Declared value.	Quantities.	Declared value.	In the quantity.	In the declared value.
			£.		£.		
Apparel		—	791,293	—	1,217,975	—	54·1
Brass and Copper manufactures . .	cwts.	181,951	803,124	327,247	1,523,744	79·8	89·7
Cordage	„	36,276	81,986	63,842	170,414	75·9	71·2
Cotton manufactures	yds.	421,385,303	12,163,513	751,12 ,624	14,985,810	79·2	23·2
Cotton twist and yarn	lbs.	63,821,440	3,975,019	123,226,519	7,266,986	93·0	82·8
Earthenware	pieces	37,028,897	461,090	53,150,903	600,759	43·5	30·3
Glass (entered by weight)		177,915	420,044	338,890	400,168	90·4	—
——— (entered at value)		—	9,580	—	21,768	—	127·2
Hardwares and cutlery	cwts.	336,194	1,622,429	353,343	1,623,961	5·1	0·09
Iron and steel (wrought or unwrought)	tons.	124,312	1,123,372	360,875	2,877,278	174·2	156·1
Leather	lbs.	1,314,931	246,410	2,623,075	332,573	99·4	34·9
Linen manufactures	yds.	69,233,892	2,400,043	90,321,761	3,200,467	30·4	33·3
——— thread, tapes, &c.	„	—	61,661	—	147,083	—	138·5
——— yarn	lbs.	110,188	8,705	25,220,290	972,466	22788·4	11071·3
Machinery and mill work		—	105,491	—	651,361	—	422·6
Silk manufactures		—	578,874	—	788,891	—	36·2
Tin and pewter wares		—	230,143	—	390,621	—	69·7
Wool, British	lbs.	3,494,275	173,105	8,471,235	555,620	142·4	220·9
Woollen and worsted yarn	„	1,592,455	158,111	4,903,291	552,148	207·9	249·2
——— manufactures	pieces	1,997,348	4,580,902	2,291,273	4,821,820	14·7	5·2
———————	yards	5,797,546	500,956	9,831,975	698,462	69·5	39·4
——— hosiery, &c.		—	150,555	—	228,391	—	51·7

In referring to the two last columns of this table, it ppears that the value of the exports did not always increase the same ratio as the quantities; but the total declared alue of all British and Irish produce and manufactures exorted in 1831 was 37,164,372*l.*; in 1841, 51,634,623*l.*; thus owing an aggregate increase of 38·9 per cent.

Another evidence of the increased commerce of the country afforded by the returns of shipping. In 1831, 20,573 ships British and foreign) engaged in the foreign and colonial ades, entered inwards; of which the total tonnage amounted 3,241,927. In 1841 the number of ships had increased to ,052, and the tonnage to 4,652,376; thus showing an increase of tonnage in the proportion of 43·5 per cent. In 32. 119,283 ships were employed (including their repeated yages) in the coasting trade, of which the tonnage amounted 9,419,681. In 1841 the number of ships had increased to 46,127, and the tonnage to 11,417,991, showing an increase f 21·2 per cent. in the tonnage employed.

Thus far an increased prosperity can admit of no doubt. It evident that consumption, production, and commerce all creased in a greater ratio than the population. But it may re be asserted that profits were low, and that, notwithstanding the outward signs of prosperity, the capital, available for rther enterprises, was not increasing with corresponding pidity. The evidences of accumulation cannot be of so stinct a character as those of consumption and production; at it may be asked in the outset, how could so vast an increase in the productive industry of the country, in the value f its exports, in its shipping and commerce, have been supported without prodigious additions to its capital? The best vidence of the quantity of capital in a country is its results. Without a sufficient quantity, production and consumption could at continue to increase: and as capital is likely to be applied production and consumption as much at one period as at nother, all that seems necessary for ascertaining the increase f capital, is to know the increase of its immediate results. If, in addition to the vast increase of production and consumption which could only have been supported by a proportionate mount of capital, we see the price of all public securities gh, the interest of money low, and capital seeking investment in every speculative enterprise, and devoted to religious d charitable objects over the whole world, it is absurd to ubt the abundance of capital. But in addition to this indirect evidence of the increase of capital, there are other dications of its accumulation, of a more direct nature, a few which may suffice:—

Notwithstanding the discouragement of insurance caused by duty of 200 per cent., the sums insured against fire in the ited Kingdom amounted in 1831 to 526,655,332*l.*, and in 41 to 681,539,839*l.*; being an increase of 29·4 per cent. e accumulations annually made through the instrumentality life assurance are known to be enormous, but no reasonable timate can be made of their amount, nor any comparison of e rate of increase in the period of which we are treating. e most interesting evidence of accumulation is presented the returns of savings' banks. In 1831 there were 429,503 positors, whose deposits amounted to 13,719,495*l.*; in 1841 ere were 841,204 depositors, and the amount of their deposits d increased to 24,474,689*l.*; so that, both in number and ount, the deposits may be said to have been doubled in this ort period of ten years. The capital invested in railways in the me period may safely be estimated at upwards of 60,000,000*l.* ee 'First Report on Railways,' 1839, Appendix); and the ms authorised by Parliament to be raised for various public rposes—for roads, bridges, docks, canals, navigations, rkets, lighting and improving towns, afford evidence of e abundance of capital which was constantly seeking investment, in addition to its customary employment in commerce d manufactures.

The returns of the assessment of property for the income x will not present any comparison of the wealth of the untry in 1831 and 1841; but very important results may be educed from them, which must not be overlooked. The nual value of real property, as assessed to the property tax 1815, was returned at 51,893,423*l.*; in 1842-3 it was turned at 95,284,497*l.* In Scotland the real property was sessed in 1811 at 5,972,523*l.*; in 1842-3 at 9,481,762*l.* arl. Paper 102 of 1845.) In the absence of any intermediate sessment a rough estimate only can be made of the increase the value of real property between 1831 and 1841; but are inclined to think it was not less than from 25 to 30 cent. In 1815 the annual profits of trade in England and Wales were assessed at 35,028,051*l.* No similar account for 1842-3 has yet been published; but as the actual receipts by government amounted to 1,466,985*l.* at 2*l.* 18*s.* 4*d.* per cent., after exempting all profits under 150*l.* a year, the annual amount of all profits above 150*l.* a year may be fairly estimated at 50,153,333*l.*; and after adding a fifth, or 10,000,000*l.*, for profits under 150*l.*, the proportion of increase which accrued between 1831 and 1841 will not be overrated at 20 per cent.

The amount of capital upon which legacy duty had been paid in Great Britain, from 1797 to 1831 inclusive, was 741,648,197*l.*; in 1841 it amounted to 1,163,284,207*l.* Thus in this period of ten years legacy-duty had been paid upon a capital of 422,636,009*l.* 19*s.* 5*d.*, or considerably more than one-half of the aggregate amount upon which the duty had been paid in the thirty-four preceding years. In 1831 the produce of the stamp-duties upon probates of wills and letters of administration in the United Kingdom amounted to 918,667*l.*; in 1841 to 1,012,481*l.*, showing an increase of 10·2 per cent.

These various statements all confirm, more or less distinctly, the conclusion which had been suggested by less direct but not less conclusive evidence, viz., that the capital of the country appears to have increased in the period of ten years from 1831 to 1841, in a greater ratio than the population; and consequently that the funds necessary for the employment of labour and for maintaining the growing population in increased comfort, had multiplied more rapidly than the people for whose use they were available.

Having now compared the increase of national wealth with the increase of population, so far as the statistics of consumption, production, and accumulation afford such comparison; a confirmation of the results presented by our analysis is to be found in the Reports of the Census Commissioners, together with many singular facts illustrative of the state and destinies of our country. In following these however it will be necessary to consider Great Britain and Ireland separately.

The first point illustrative of the condition of the people is, that the increase in the number of inhabited houses in England and Wales since 1831 was two per cent. greater than that of the population. Too much reliance however must not be placed upon this bare statistical result, as the quality of the houses may be a more important matter than their positive number; but so far as it goes it is satisfactory. The misery and destitution which prevail in many parts of Great Britain are undeniable; squalid poverty and glittering wealth meet the eye in every street; but the apparent fact of an increased house accommodation should make men hesitate before they declare that poverty is spreading at one extremity of society while wealth is agglomerating at the other. Apart from this direct evidence that one of the most painful results of poverty, the overcrowding of many families into the same houses, though painfully prevalent in Liverpool and some other places, has not generally increased—it may be asked what better proof, amongst many, can be given of the general prosperity of the masses of the people than the application of so vast a capital to productive industry as must have been required for the building of 500,000 new houses in a space of ten years?

It is well known that the rate of increase of the population from 1831 to 1841 in England and Wales was apparently less than in the preceding ten years, by 1½ per cent.; and if the bare fact of numerical increase were taken as a test of national strength and prosperity, this fact might be deemed a symptom of decay. To this discouraging view, however, a complete answer is given by the commissioners, who ascribe the apparently diminished rate of increase wholly to emigration. 'The additional population which would be required in order to make the ratio of increase equal to that of the former decennial period would be 208,998, being 1½ per cent. on the population of 1831; and from returns which have been furnished from the Emigration Board, it appears that the total excess of emigration in the ten years ending 1841, compared with the ten years ending 1831, may be estimated at 282,322.' (See Preface, p. 11.) Thus, instead of attributing this apparent decrease to the pressure of poverty by which the natural growth of population was checked, we must ascribe it to a cause which is calculated to raise the wages of labour in this country, while it affords to the emigrants a wider field and, we trust, a larger reward for their industry.

Another fact of the highest importance is clearly proved, viz.—that the commerce and manufactures of Great Britain alone afford employment for the increasing population. While the increase upon the whole kingdom amounted, as already stated, to 13·2 per cent., the increase in the manufacturing and commercial counties was greatly above that proportion, and in the agricultural counties considerably below it. In Chester the increase was 18·3 per cent.; in Durham, 27·7; in Lancaster, 24·7; in Middlesex, 16; in Monmouth, 36·9; in Stafford, 24·3; in Warwick, 19·3; and in the West Riding of York, 18·2. In Buckingham the increase was only 6·4 per cent.; in Cumberland, 4·9; in Devon, 7·8; in Dorset, 9·9; in Essex, 8·6; in Hereford, 2·4; in Norfolk, 5·7; in Oxford, 6·2; in Suffolk, 6·3; in Westmoreland, 2·5; and in the North Riding of York, 7 per cent. It is useless therefore to discuss the relative importance of agriculture and manufactures in the abstract; for agricultural counties cannot support their own population; while the manufacturing and commercial counties find employment for their own natural increase and for the surplus of other counties which the land cannot maintain.

The relative increase of the agricultural and commercial population is shown by the following proportions per cent.:—

	Agricultural.	Commercial.	Miscellaneous.
1831	28	42	30
1841	22	46	32

But in 1831 the returns referred to families, and in 1841 to individuals; and as a greater number of children are employed in manufactures than in agriculture, the difference may have been slightly augmented by this form of enumeration.

A still more important point of comparison is the relative increase of different classes of occupation in the same period of 10 years from 1831 to 1841. A comparative return of the Commissioners (Preface, p. 21) includes males only aged 20 years and upwards, and exhibits the following results:—The number of occupiers and labourers in agriculture had decreased in that period from 1,251,751 to 1,215,264; but the Commissioners explain this result by supposing that numerous farm-servants had been returned in 1841 as domestic servants instead of as agricultural labourers. Persons engaged in commerce, trade, and manufacture had increased from 1,572,292 to 2,039,409 (or 29·7 per cent.): capitalists, bankers, professional and other educated men, from 216,263 to 286,175 (or 32·3 per cent.): labourers employed in labour not agricultural had *decreased* from 611,744 to 610,157: other males 20 years of age, except servants, had increased from 237,337 to 392,211: male servants 20 years of age and upwards had increased from 79,737 to 164,384, including, however, as already noticed, many farm-servants. For the purpose of instituting a just comparison of the relative increase of particular employments it must be understood that the total number of male persons 20 years of age and upwards (exclusive of army, navy, and merchant seamen) had increased, in this period of ten years, from 3,969,142 to 4,707,600 (or 18·6 per cent.). Making due allowance for the probable error in the return of agricultural labourers, we are forced to conclude that that class had either not increased at all or had increased in a very small degree; and that the class of labourers not agricultural had positively diminished: while capitalists, bankers, professional and other educated men, had increased 32·3 per cent.; persons engaged in trade and in manufactures 29·7 per cent.; and domestic servants 106 per cent., or allowing for farm-servants, say 90 per cent. Thus the two classes who earn the lowest wages were alone stationary or retrograde: the highest class in wealth and intelligence had increased 32·3 per cent.; and the domestic servants, whose numbers are a certain indication of the means of their employers, had increased 90 per cent. Nor must another important fact be omitted in connexion with the decrease in the class of labourers, viz. the immense numbers of Irish who notoriously perform the most laborious parts of industry. In Lancashire the persons born in Ireland formed, in 1841, 6·3 per cent. upon the whole population; in Cheshire, 3 per cent.; in Middlesex, 3·6 per cent.; in Ayrshire, 7·3; in Dumbartonshire, 11; and in Lanarkshire and Renfrewshire, upwards of 13 per cent. It would seem therefore that the class of British labourers are gradually raising themselves into a higher condition and more lucrative employments; and that the demand for the lowest description of labour, caused by their withdrawal from it, is supplied by their Irish brethren.

The number of female domestic servants increased in Great Britain from 670,491 in 1831, to 908,825 in 1841 per cent.

In concluding this statement of the industrial occup the people of Great Britain, it is gratifying to learn whole of the 'almspeople, pensioners, paupers, luna prisoners' amounted in 1841 to 1·1 per cent. only u population. It must be understood, however, that th ment does not include persons receiving parochia unless they be resident in workhouses.

We may now pass to some of the most material f closed by the census of Ireland. The constant mig labourers from the agricultural counties of England manufacturing districts, and the extensive emigratio last ten years, have been already noticed; and preci same circumstances are observable in Ireland. In th from 1831 to 1841 no less a number than 403,459 left Ireland, either to settle in the populous towns Britain or to emigrate to the British Colonies or th States; while an extensive migration was taking plac Ireland itself, to Dublin and to other commercial an facturing places.

The returns of house accommodation in Ireland p very lamentable picture. The Commissioners have a judicious classification by which the houses are disti under four classes, the last being that of the cabin hut with one room, and the third class but one degre The following statement shows the proportion per cen the number of families in each class of accommodation the total number of families:—

	1st Class.	2nd Class.	3rd Class.
Rural districts	1·2	15·3	40·
Civic districts	7·	22·4	33·9

The value of this classification is obvious, and if h adopted in England it will render the statistics o accommodation of considerably greater weight in es the social condition and habits of the people. A m upon a common ought not to rank even, in the array of with the mansions of wealthy cities.

Even in Ireland it appears that manufactures are at the agricultural population; for the number of famil gaged in trade and manufactures have increased five p since 1831; and the number employed in agricultur diminished in a corresponding proportion.

The population have been divided by the commi into three great classes, nearly equivalent to the three grades of society: and the proportions of families a follow:—

	Rural.	Ci
Vested means, professions, &c.	1·8	6
The direction of labour . .	28·3	50
Their own manual labour . .	68·	36
Means not specified . . .	1·9	7

The occupations of all individuals above 15 years of classified: 1st, as ministering to food; 2nd, as ministe clothing; 3rd, as ministering to lodging, &c.; 4th, as tering to health, education, &c.; and 5th, as unclass miscellaneous; each class bearing respectively the fo proportions to the entire population, viz. 23·3; 11 17·; and 6·. But as no similar classification had ev adopted before, no comparison is practicable with a ceding period.

The report of the Irish Census Commissioners abo highly interesting inquiries into the condition of th people; but as they do not afford any comparison w year 1831, the object which we had proposed cannot ried any further with respect to that country.

This succinct view of the material progress of so far as it admits of elucidation by statistics, is certainly plete without a consideration of its advance or retro in religion, in morals, and in education; but those qu far more important in themselves than any we have h cussed, are not so immediately connected with the re the Census.

I.—Tables of Population, Occupation, &c.: 1841.

1.—Total Population of each County in Great Brit cording to the Census taken 7th June, 1841; show per-centage on the Total Population employed in Com Trade, and Manufacture, and in Agriculture.

Number of persons employed in Textile Manufactures in Great Britain :—

Manufacture.	Persons employed.
Cotton	377,662
Hose	50,955
Lace	35,347
Wool and Worsted	167,296
Silk	83,773
Flax and Linen	85,213
	800,246

The age and sex of the above-mentioned 800,246 persons were as follows :—

	Aged Twenty years and upwards.	Under Twenty.	Total.
Males	344,121	109,260	453,381
Females	211,070	135,795	346,865
Total	555,191	245,055	800,246

Number of Persons employed in some other branches of manufacturing industry :—

Manufacture.	Persons employed.
Pottery, china, and earthenware	24,774
Glass and glass bottles	7,464
Gloves	9,225
Engines and machines	16,550

Number of persons employed in Mines :—

Coal	193,876
Iron	10,949
Copper	15,407
Lead	11,419
Tin	6,101
Manganese	275
Salt	268
Mine not specified	31,173

III.—Ages of Persons living in England, Wales, and Scotland.

England.

	Males.	Females.
Under 5	981,722	995,855
5 to 10	891,985	894,908
10 „ 15	824,033	800,487
15 „ 20	731,899	757,487
20 „ 25	679,459	782,834
25 „ 30	573,785	635,750
30 „ 35	531,114	570,042
35 „ 40	408,723	424,841
40 „ 45	411,009	428,604
45 „ 50	294,250	305,724
50 „ 55	288,225	307,539
55 „ 60	176,512	188,408
60 „ 65	195,281	215,099
65 „ 70	112,319	129,185
70 „ 75	97,224	111,945
75 „ 80	51,545	59,301
80 „ 85	28,495	35,564
85 „ 90	9,180	12,462
90 „ 95	2,236	3,575
95 „100	442	799
100 & upwards	72	141
Not specified	33,877	11,201

Wales.

	Males.	Females.
Under 5	60,996	60,579
5 to 10	56,102	55,437
10 „ 15	51,681	49,961
15 „ 20	45,501	46,468
20 „ 25	40,055	42,828
25 „ 30	33,784	35,226
30 „ 35	30,604	31,209
35 „ 40	23,996	23,980
40 „ 45	22,292	23,102
45 „ 50	17,518	18,974
50 „ 55	17,331	19,132
55 „ 60	12,139	13,449
60 „ 65	12,689	15,204
65 „ 70	7,769	9,489
70 „ 75	6,283	8,058
75 „ 80	3,771	4,904
80 „ 85	2,453	3,699
85 „ 90	908	1,364
90 „ 95	242	463
95 „100	52	123
rds.	10	26
d	1,581	271

Scotland.

	Males.	Femal
Under 5	173,794	168,99
5 to 10	158,712	154,80
10 „ 15	150,832	146,05
15 „ 20	128,196	141,96
20 „ 25	113,397	141,07
25 „ 30	92,779	113,16
30 „ 35	85,434	102,05
35 „ 40	643,872	76,91
40 „ 45	66,707	79,21
45 „ 50	45,874	52,5
50 „ 55	45,000	56,3
55 „ 60	28,745	34,2
60 „ 65	33,451	43,0
65 „ 70	17,355	21,7
70 „ 75	16,151	21,2
75 „ 80	8,725	11,2
80 „ 85	5,620	8,1
85 „ 90	1,848	2,6
90 „ 95	593	8
95 „100	141	2
100 & upwards.	45	
Not specified	8,191	1,6

Ages of Persons in England, Wales, and Scotland, what would be the Number of Persons of the specified Ages supposing the number of Males and whose ages were returned to have been Ten T respectively.

	England.		Wales.		Scotl
	Males.	Females.	Males.	Females.	Males.
Under 5	1347	1300	1367	1307	1403
5 to 10	1224	1168	1257	1196	1281
10 „ 15	1130	1045	1168	1078	1218
15 „ 20	1004	989	1020	1002	1035
20 „ 30	1719	1851	1655	1683	1664
30 „ 40	1289	1298	1224	1189	1217
40 „ 50	967·5	958·6	892·3	907·5	908·9
50 „ 60	637·5	647·4	660·5	702·7	595·4
60 „ 70	421·9	449·4	458·5	532·6	410·2
70 „ 80	204·1	223·5	225·3	279·6	209·6
80 „ 90	51·6	62·6	75·3	109·2	60·2
90 „100	3·6	5·7	6·5	12·6	5·9
100 & upwards	·09	·18	·22	·56	0·3

IV.—Population and Occupations in Irelan

Counties and Towns.	Total No. of Persons.	Chiefly employed in	
		Agri-culture.	Manufactures, Trade, &c.
Antrim	276,188	27,174	20,239
Belfast Town	75,308	2,532	9,897
Carrickfergus	9,379	669	820
Armagh	232,393	24,260	15,966
Carlow	86,228	10,498	3,139
Cavan	243,158	31,887	8,338
Clare	286,394	37,834	7,445
Cork	773,398	97,723	22,397
—— City of	80,720	4,272	8,529
Donegal	296,448	38,147	12,761
Down	361,446	35,291	27,473
Drogheda Town	16,261	863	1,866
Dublin	140,047	12,867	6,971
—— City of	232,726	7,333	27,729
Fermanagh	156,481	20,665	6,127
Galway	422,923	58,609	10,809
—— Town of	17,275	780	1,969
Kerry	293,880	39,985	7,749
Kildare	114,488	12,517	3,385
Kilkenny	183,349	22,696	5,021
—— City of	19,071	1,118	1,899
King's	146,857	17,582	4,461
Leitrim	155,297	21,663	4,067
Limerick	281,638	35,878	6,713
—— City of	48,391	2,851	4,653
Londonderry	222,174	23,089	15,169
Longford	115,491	15,363	3,706
Louth	111,979	13,099	6,633
Mayo	388,887	56,605	10,029
Meath	183,828	23,978	6,043
Monaghan	200,442	26,809	8,087
Queen's	153,920	19,346	5,098
Roscommon	253,591	36,739	6,206
Sligo	180,886	24,960	5,454
Tipperary	435,553	52,805	13,512
Tyrone	312,956	37,276	16,923
Waterford	172,971	20,499	5,159
—— City of	23,216	1,136	2,832
Westmeath	141,300	18,090	4,880
Wexford	202,033	24,664	8,147
Wicklow	126,143	14,032	4,740

INCES:

r	1,973,731	214,046	92,692	55,396
r	2,396.161	292,983	78,989	43,182
	2,386,373	267,799	141,801	30,205
ght	1,418,859	199,360	38,534	17,800
tal	8,175,124	974,188	352,016	156,583

pulation of Cities and Boroughs returning Members to Parliament.*

1.—ENGLAND.

	Total Persons.		Total Persons.
m	5,502	Honiton	3,773
, St.	6,246	Horsham	5,574
r	4,997	Huddersfield	24,931
l	2.583	Hull, Kingston-upon	65,670
on	3.841	Huntingdon	5,500
under-Lyne	22,514	Hythe	8,939
ry	56,764	Ipswich	24.660
r	7,199	Ives, St.	8,645
ple	10,259	Kendal	11,519
w (*see* Retford, East)		Kidderminster	15,427
ty	52,346	King's Lymn	15,751
	8.578	Knaresborough	5,382
-upon-Tweed	12,578	Lambeth	197,412
r	8,409	Lancaster	14,389
r	7,458	Launceston	6,070
ham	181,116	Leeds	151,063
rn	36,186	Leicester	50,365
	5,901	Leominster	4,846
	50,163	Lewes	9,282
	14,618	Lichfield City	6,587
d	66,508	Lincoln City	13,411
rth	1,931	Liskeard	4,226
ater	9,668	Liverpool	282,656
t	7,166	London City‡	120,702
n	48,567	Ludlow	5,171
City	123,188	Lyme Regis	3,376
ham	7,978	Lymington	4,926
	24,759	Macclesfield	32,523
Edmunds	12,168	Maidstone	16,920
	5,100	Maldon	4,968
ge City	23,455	Malmesbury	6,674
idge University		Malton	6,875
ury City	15,422	Manchester	240,367
City	20,815	Marlborough	4,139
n	17,903	Marlow, Great	6,237
am	31,207	Marylebone	287,465
City	22,961	Midhurst	6,578
ter City	8,084	Monmouth District, comprising	
ham	6,606	Monmouth	5,822
urch	6.634	Newport	10,271
ster	5,840	Usk	1,503
e	11,324	Morpeth	7,160
outh	6,420	Newark-upon-Trent	10,218
er	17,532	Newcastle-under-Line	10,038
y City	30,179	Newcastle-upon-Tyne	69,430
le	34,381	Newport, Isle of Wight	6,330
th	4,663	Northallerton	4,861
	32,407	Northampton	20.637
	6,156	Norwich City	60,982
rt	40,559	Nottingham	51,441
ter	5,402	Oldham	60,109
	17,795	Oxford City	23,656
h	6,588	†Oxford University	
	31,157	Penryn and Falmouth	12,160
City	9,577	Peterborough City	6,991
n	4,245	Petersfield	5,201
City	37,231	Plymouth	35,040
	7,347	Pontefract	10,688
h (*see* Penryn)		Poole	8,449
r	265,043	Portsmouth	49,214
	9,699	Preston	50,332
d	19,843	Reading	18,499
er City	14,497	Reigate	4,415
m	8,786	Retford, East	44,132
ch, &c.	72,748	Richmond	4,300
, Great	6,698	Ripon	5,927
d	5,925	Rochdale	24,091
	26,694	Rochester City	11,949
l	3,730	Rye	7,667
	11,614	Salford	66,624
	8,169	Salisbury	11,626
l City	11,367	Sandwich	11,194
	5,463	Scarborough	9,953
Shaftesbury	9,462	Wakefield	18,486
Sheffield	109,597	Wallingford	7,780
Shields, South	22,942	Walsall	19,654
Shoreham, New	27,980	Wareham	6,646
Shrewsbury	17,088	Warrington	21,116
Southampton	27,490	Warwick	9,124
Southwark	142,620	Wells City	4,607
Stafford	9,149	Wenlock	19,774
Stamford	7,384	Westbury	7,454
Stockport	50,154	Westminster City	219,930
Stoke-upon-Trent	67,798	Weymouth and Melcombe Regis	8,784
Stroud	37,668	Whitby	9,862
Sudbury (since disfranch.)	5,728	Whitehaven	15,841
Sunderland	52,818	Wigan	25,167
Tamworth	7,662	Wilton	8,057
Taunton	12,306	Winchester City	9,370
Tavistock	6,075	Windsor, New	9,062
Tewkesbury	5,721	Wolverhampton	92,943
Thetford	3,844	Woodstock	7,404
Thirsk	5,132	Worcester City	26,306
Tiverton	9,838	Wycombe, Chipping	6,480
Totness	4,240	Yarmouth, Great	27,550
Tower Hamlets	419,730	York City	30,152
Truro	9,901		
Tynemouth & N. Shields	25,165		

2.—WALES.

Districts and Boroughs.

BEAUMARIS District. Amlwch, 3373; Beaumaris, 2680; Holyhead, 2974; Llangefni, 1348. Total, 10,375.

Brecon, 5317.

CARDIFF District. Cardiff, 9714; Cowbridge, 1,080; Llantrissent, 855. Total, 11,649.

CARDIGAN District. Aberystwith, 4975; Adpar, 1619; Cardigan 3800 Lampeter, 902. Total, 11,296.

CARMARTHEN District. Carmarthen, 9403; Llanelly, 6818. Total, 16,221.

CARNARVON District. Bangor City, 5058; Carnarvon, 7843; Conway, 1828; Cricceith, 604; Nevin, 1656; Pwllheli, 2601. Total, 19,590.

DENBIGH District. Denbigh, 5228; Holt, 1058; Ruthin, 3271; Wrexham, 5831. Total, 15,388.

FLINT District. Asaph, St., City, 1701; Caergwyle, 755; Caerwys, 690; Flint, 3265; Holywell, 5864; Mold, 3557; Overton, 1662; Rhuddlan, 2782. Total, 20,276.

HAVERFORDWEST District. Fishguard, 1497; Haverfordwest, 5849; Narberth, 1236. Total, 8582.

Merthyr Tydvil, 42,917.

MONTGOMERY District. Llanfyllin, 1106; Llanidloes, 2742; Machynlleth, 1672; Montgomery, 1176; Newtown, 6535; Welshpool, 4670. Total, 17,901.

PEMBROKE District. Milford, 2377; Pembroke, 7212; Tenby, 2512: Wiston, 775. Total, 12,876.

RADNOR, NEW, District. Cefn-Llys, 26; Knighton, 1183; Knucklas, 270; Presteign, 1550; New Radnor, 2478; Raydrgwy, or Rhayader, 912. Total, 6419.

SWANSEA District. Aberavon, 3665; Kenfig, 462; Loughor, 573; Neath, 4967; Swansea, 22,982. Total, 32,649.

3.—SCOTLAND.

Parliamentary Cities, Burghs, and Districts of Burghs.

Aberdeen (city), 61,923; Dundee (burgh), 62,873; Edinburgh (city), 132,977; Glasgow (city), 255,650; Greenock (burgh), 35,645; Paisley (burgh), 47,695; Perth (city), 20,167.

Districts of Burghs.

ANDREWS, ST., District. Constituted as follows:—Andrews, St., 4449; Anstruther Easter, 1008; Anstruther, Wester, 339; Crail, 1221 Cupar, 5137; Kilrenny, 1719; Pittenween, 1309. Total, 15,182.

AYR District. Ayr 15,749; Campbeltown, 6782; Inverary 1092 Irvine, 7313; Oban, 1398. Total, 32,334.

DUMFRIES District. Annan, 3321; Dumfries, 13,088; Kirkcudbright, 2588; Lockmaben, 931; Sanquhar, 1700. Total, 21,628.

ELGIN District. Banff, 5309; Cullen, 1564; Elgin, 5064; Inverury, 1679; Kintore, 465; Peterhead, 5759. Total, 19,840.

FALKIRK District. Airdrie, 12,408; Falkirk, 8203; Hamilton, 8689; Lanark, 4467; Linlithgow, 4009. Total, 37,776.

HADDINGTON District. Dunbar, 2978; Haddington, 3743; Jedburgh, 3277; Lauder, 1148; North Berwick, 1037. Total, 12,189.

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mates of public institutions are not included.

lective franchise of the Universities of Oxford and Cambridge is the Doctors and Regent Masters of Arts in Convocation.

opulation of the several parishes and places forming the metropolis, limits adopted by the Registrar-General, was 1,873,676.

Inverness District. Forres, 3173; Fortrose, 955; Inverness, 11,568; Nairn, 2384. Total, 18,080.

Kilmarnock District. Dumbarton, 4391; Kilmarnock, 19,398; Renfrew, 2012; Rutherglen, 5623; Port Glasgow, 6943. Total, 38,367.

Kirkcaldy District. Burntisland, 1859; Dysart, 7057; Kinghorn, 1542; Kirkcaldy, 9778. Total, 20,236.

Leith District. Leith, 25,984; Portobello, 3588; Musselburgh, 6116. Total, 35,688.

Montrose District. Aberbrothwick, or Abroath, 14,568; Brechin, 5903; Forfar, 7981; Inverbervie, or Bervie, 864; Montrose, 14,252. Total, 43,568.

Stirling District. Culross, 587; Dunfermline, 13,296; Inverkeithing, 1827; Queensferry, 1233; Stirling, 10,701. Total, 27,644.

Wick District. Cromarty, 1936; Dingwall, 1732; Dornoch, 448; Kirkwall, 3046; Tain, 1872; Wick, 5522. Total, 14,556.

Wigtown District. Galloway, New, 430; Stranraer, 4878; Whithorn, 1513; Wigtown, 1860. Total, 8681.

4.—Ireland.

Boroughs.	Total Persons.	Boroughs.	Total Persons.
Armagh	10,245	Enniskillen	5,686
Athlone	6,393	Galway	32,511
Bandon	8,275	Kilkenny	23,625
Belfast	63,625	Kinsale	6,918
Carlow	10,409	Limerick	65,296
Carrickfergus	9,379	Lisburn	7,524
Cashel	8,027	Londonderry	15,150
Clonmel	13,505	Mallow	6,851
Coleraine	6,255	New Ross	7.543
Cork	106,055	Newry	13,227
Downpatrick	4,866	Portarlington	3,106
Drogheda	19,260	Sligo	14,318
Dublin	238,531	Tralee	11,363
Dundalk	10,782	Waterford	29,288
Dungannan	3,801	Wexford	11.252
Dungarvan	12,382	Youghal	9,939
Ennis	9,318		

CENTRAL CRIMINAL COURT.—This is a court established in 1834, by 4 & 5 Wm. IV. c. 36, for the trial of treasons, murders, felonies, and misdemeanors committed within the city of London and county of Middlesex, and parts of Essex, Kent, and Surrey. By § 22 the court is authorized to try offences committed on the high seas and other places within the jurisdiction of the Admiralty of England. The Justices of the Peace are prohibited by the act from trying at their sessions persons charged with capital, and a variety of other offences, alleged to have been committed within the jurisdiction of the act. This jurisdiction comprises the whole of Middlesex; in Essex the parishes of Barking, East Ham, West Ham, Little Ilford, Low Layton, Walthamstow, Wanstead, Woodford, St. Mary, and Chingford; in Kent, Charlton, Lee, Lewisham, Greenwich, Woolwich, Eltham, Plumstead, St. Nicholas Deptford, that part of St. Paul Deptford which is within Kent, the liberty of Kidbrook, and the hamlet of Mottingham; in Surrey, the borough of Southwark, the parishes of Battersea, Bermondsey, Camberwell, Christchurch, Clapham, Lambeth, St. Mary Newington, Rotherhithe, Streatham, Barnes, Putney, that part of St. Paul Deptford which is within Surrey, Tooting Graveney, Wandsworth, Merton, Mortlake, Kew, Richmond, Wimbledon, the Clink Liberty, and the district of Lambeth palace.

The area and population of the different parts of the Central Criminal Court jurisdiction are as follows:—

	Sq. miles.	Population, 1841.
Middlesex	282	1,576,636
Essex (parts of)	53¾	36,609
Kent	30¾	101,719
Surrey	50¾	413,046
	417¼	2,128,010

For all purposes under the act the above district is considered as one county, and in all indictments and presentments the venue runs 'Central Criminal Court to wit.'

The judges of the Central Criminal Court are appointed by the act to be any two or more of the following persons: the lord mayor for the time being of the city of London, the lord chancellor or the lord keeper of the great seal, and all the judges for the time being of his Majesty's courts of King's Bench, Common Pleas, and the Exchequer, the chief judge and the two other judges in Bankruptcy, the judge of the Admiralty, the dean of the arches, the aldermen of the city of London, the recorder, the common serjeant, the
sheriffs court of the city of London for the ti
any person or persons who hath or shall have be
cellor, lord keeper, or a judge of any of his maje
courts of Westminster, together with such other
jesty, his heirs and successors, shall from time
and appoint by any general commission. T
selecting the judges from so extensive a list re
cessary to issue a commission every time the ses
and the period of holding the sessions is not inte
the judges of the courts at Westminster are abse
The sessions are held twelve times a-year at th
and in the New Court adjoining, and the judg
two of the common-law judges and the recorde
of London. Before the Central Criminal Co
blished sessions were held at the Old Bailey eigh
for the trial of offences committed in Middle
were returned by a grand jury sitting at Clerk
the jurisdiction of the county magistrates.
mitted at Southwark or Greenwich, both of whi
be regarded as parts of the metropolis, were, i
Southwark, tried at Guildford, Kingston, or
might happen, and from Greenwich an offender
trial to Maidstone. From the great amount of p
calendars were necessarily so heavy that a win
came necessary for parts of the Home Circui
still better to place the whole metropolitan distr
jurisdiction, and to have a jail delivery every
weeks.

Jurors are summoned by the sheriffs of the cit
and of the counties of Middlesex, Essex, Kent
according to the parts of the district in which
The juries are selected from London alone; or
sex and the parts of counties which are within
the act; or from both indiscriminately. Jurors
Kent, and Surrey, who have served upon any
Central Criminal Court are exempted, for the
months, from serving upon any jury in any cour
sessions of the peace) held in the county in w
side.

The area over which the jurisdiction of the Ce
Court extends is about the 130th part of the are
and Wales, but the population is between 1-7t
that of England and Wales. Nearly as many
annually tried at the Central Criminal Court
county assize courts in England and Wales.
number of persons tried at all the different c
follows:

	Number.	Pro
County Quarter Sessions Courts	13,157	
Circuit Assize Courts	3,557	
Borough Courts	4,252	
Central Criminal Court	3,483	

The following is a statement of the number o
victed at the Central Criminal Court in the ye
cifying their offences and sentences:—arson, 1
burglary, 51; cattle stealing, 1; child stealin
7; coin, feloniously uttering counterfeit, 5;
ing and larceny, 1; cutting and wounding,
murder, &c., 16; embezzlement, 80; forging
forged instruments, 38; horse stealing, 19;
and larceny, 30; larceny, larceny person and
vant, 1652; larceny in a dwelling-house above
stealing from the post-office a, 2; letter, sendin
3; manslaughter, 12; misdemeanor, 221; mo
possession a, 2; murder, 3; rape, 7; receiving
30; robbery, 21; sheep stealing, 5; ship, des
a, 1; ship, revolt on board a, 1; shooting at
intent to murder, 2; threats, demanding money
natural crime, 1; warehouse breaking and lar
2306.

Of which criminals there were sentenced—to d
one was executed), 2; transportation for life,
years, 7; for fifteen years, 37; for fourteen
twelve years, 3; for ten years, 194; for seve
total transported, 527. Imprisoned in New
Houses of Correction, for three years, 2; for
for eighteen months, 27; for one year, 259; fo
90; for eight months, 1; for six months,
months, 132; for three months, 406; for two
for six weeks, 8; for one month and under, 26
Fined, 2. Discharged on recognizance, 2. In
ber sentenced was 2862.

for allowing moss to grow over the surface of the soil in which they are planted. They can only be increased by seed.

(Lindley, *Natural System;* Don, *Gardeners' Dictionary.*)

CE'PHALUS. [GYMNODONTES, P. C. S.]

CERA'MIEÆ. [WATER PLANTS, P. C.]

CERAMLAUT ISLANDS are a group of islands situated in the Indian Archipelago, near the eastern extremity of the large island of Ceram, between 3° 30′ and 4° S. lat., and between 130° 30′ and 131° 30′ E. long. The group consists of three larger islands, and an unknown number of smaller islands. The larger islands are called Great Keffing, Little Keffing, and Ceramlaut. All the islands belonging to this group lie on a coral bank, which extends to the eastern extremity of the island of Ceram. The depth of water on the banks varies between two and four fathoms, but near it the sea is unfathomable. In climate and productions the Ceramlaut Islands do not materially differ from the Moluccas, of which they are considered to constitute a portion. Many of these islands are well cultivated and very populous. The villages are large, and each of them constitutes an independent community, governed by a chief. These small states are continually quarrelling, and often at war, and the villages are fortified by walls of considerable height and thickness; and other walls have been erected to mark the respective boundaries. The inhabitants are Mohammedans, and almost every place contains a mosque.

The inhabitants of the Ceramlaut Islands, and those of the Goram Islands, a neighbouring group consisting of three rather large islands, Goram, Manowolko, and Salawako, are remarkable as constituting a link in the commercial intercourse of the world. By means of these alone the inhabitants of Papua or New Guinea export the produce of their country, and are supplied with those articles of foreign merchandise which are in demand among them. This commerce is very considerable. Each island has a district on the coast of Papua with which it carries on an exclusive commerce. If the inhabitants of another island went to visit it for commercial purposes it would be the cause of a war. The inhabitants of Papua, on their side, are also disinclined to enter into a commercial intercourse with any persons except those who commonly visit them. The number of vessels employed in this commerce is very considerable: from Enekka alone, a place in the island of Goram, twenty junks annually depart for the coast of Papua. Some of the chiefs of the islands have married natives of Papua, and have thus entered into a more close connexion with the inhabitants. It is also stated, that they have succeeded in introducing the Mohammedan religion at several places on that coast. The monopoly which the islanders claim of the trade with Papua is so strict that even European vessels find it necessary to engage some of them when they go to a harbour in Papua; for without their assistance it would be impossible to trade. The articles which are exported by them from Papua are slaves, nutmegs, tripang, tortoiseshell, and edible birds'-nests; and the imports consist of guns, gunpowder, small cannons, cotton-cloth, corals, Chinese goods, iron, hardware, and some smaller articles. The imported goods are sent by the islanders to Bali and Sumbauwa, or are fetched by the Bugies from Boni or Celebes, who carry them to Singapore, or to some other harbour in Celebes or Borneo which is visited by Chinese junks, in which manner they find their way to Canton and other Chinese ports.

The Ceramlaut, as well as the Goram Islands, are frequently visited by English and American whalers, which export a considerable quantity of nutmegs, mace, and cloves, which they obtain by barter for guns, gunpowder, cotton-cloth, and some other articles.

The Dutch consider these islands as forming a portion of their widely-spread dominions in the Indian Archipelago; but they have no settlement on them, nor does it appear that they ever had. From time to time however they send a vessel there to settle the disputes which have arisen between the small independent states, or to terminate their wars. It appears however that this is only done when the president of Banda is applied to by the natives for that purpose. The commercial intercourse between Banda and the Ceramlaut and Goram groups is very great. The agricultural produce of the islands finds a ready market at Banda. The inhabitants of Banda are almost exclusively occupied in the cultivation of the nutmeg-trees; and sago, oil, cocoa-nuts, live stock, wood, areca-nuts, and betel, are imported in large quantities. The islanders bring these articles to Banda in their own vessels, which however are not built by them, but bought on the Key Islands or in Bali. The larger praws are
Bali.

(Kolff, *Reize door den weinig bekenden zujd*
lukschen Archipel.)

CERA'STIUM (from κέρας, a horn), a genu
belonging to the natural order Caryophylleæ.
5-parted calyx, 5 petals, all bifid; stamens, 10
styles, 5 or 4; the capsules tubular, opening at th
10 teeth. This is an extensive genus, contain
which are common weeds in the temperate clima
parts of the world. Don enumerates eighty-two
these nine are British.

C. alpinum, Alpine Mouse-ear Chickweed,
ascending stem, the leaves ovate, ovate-oblong,
the flowers few; the sepals bluntish, with membran
bracts herbaceous, their margins often narrowly m
the capsules, at length, twice as long as the calyx.
is a native of the Pyrenees, the mountainous parts o
Scotland, and of Melville Island. It is subject to
tions, and a number of varieties have been describe
Bentham, and other botanists.

C. glomeratum has ovate leaves, acute lance
with a narrow membranous margin, and, as well
ceous bracts, hairy throughout; the capsule cylindri
ing, twice as long as the calyx; fruitstalks about as
calyx. This is a common plant in fields and on ba
ing from April to September. The other British
C. triviale, common in fields; *C. semidecandrum*
dry places; *C. atrovirens*, inhabiting sandy place
near the sea; *C. pumilum*, found only near
Surrey; *C. tetrandrum*, found at Tynemouth and
C. latifolium, a rare plant; and *C. arvense*,
chalky and gravelly places.

A few of the species, as *C. tomentosum*, *C. gr*
and *C. Dahunicum*, are worth cultivating as bord
C. latifolium, *C. alpinum*, and *C. glaciale*, are
growing on rock-work, or in small pots, when they
placed in a mixture of loam, sand, and peat. T
the same general treatment as most hardy plants.
species may be propagated by sowing seed in an op
the spring; the perennial, by dividing the plants

(Don, *Gardeners' Dictionary;* Babington, *Ma*

CERATI'TES, a subdivision of the Ammoni
posed by Haan. It is peculiar to the Muschelkal
TITES, P. C.]

CERATOPHYLLUM. [CERATOPHYLLEÆ,

CE'REBRUM. [BRAIN, P. C.]

CEREVI'SIÆ FERMENTUM, *Medical Pr*
Yeast, barm, or zumin, has been known as long a
drinks, being the active or exciting agent by wh
formed out of saccharine juices. [WINE, P. C.]
mate nature and mode of action of ferments have
with great care by Turpin, Cogniard Latour,
Liebig, M. Rousseau (*Comptes Rendus*, No. 1
1843), and Bouchardat (*Comptes Rendus*, and
vol. v. p. 401). These observers have establish
differences in ferments; but it is to the common y
brewers that the following observations apply.
or that of any gluten-like material, excites in sacc
an intestine motion, by which, if there be sufficie
sugar is resolved into alcohol and carbonic acid.
this change is taking place that yeast is deemed
It is employed both internally and externally. I
case, the malt which supplied the saccharine
often been given along with or instead of it, und
of malt or wort. It was highly commended by
bride, in the treatment of scurvy, before the utilit
juice was generally recognised; and some recent
given instances of its advantageous employment.
tion to its use is, that it generally increases th
But this is not invariably the case. It has b
recommended, by Dr. Stoker of Dublin, in ty
and enemata made with it have proved useful aga
tympanites. All this is extremely probable, from
nation given by Liebig of the manner in which f
mote the digestive process. (*Animal Chemistry.*)

The yeast poultice is an excellent application t
gangrenous ulcers, with offensive discharge and
granulations. It must be renewed every six hours.
ficial influence is not owing solely to the carbon
evolved, as the same good effects do not follow wh
of carbonic acid gas is directed on the sores. Dr. S
liams of the United States strongly recommends a

Dictionary of Spanish Artists, about one hundred pages of fragments from the writings of Céspedes on painting, including the entire poem on painting, which contains 608 lines.

(Cean Bermudez, *Diccionario Historico*, &c.)

CE'SSIO BONO'RUM, in the law of Scotland, is the name given to a process by which, as by the insolvency system in England, the estate of an insolvent person who does not come within the operation of mercantile bankruptcy is attached and distributed among his creditors. The term is derived from the deed of cession, or the assignment by which, as the counterpart of the relief afforded to him from the immediate operations of his creditors, the insolvent conveys his whole property for their behoof. Both the nomenclature and the early practice of the system are taken from the Roman law. (*Dig.* 42, tit. 3, 'de cessione bonorum.') According to the more antient law, the person released from prison on a cessio bonorum was bound to wear a motley garment called the dyvour's habit. In later times this stigma became the penalty of fraud, and it was subsequently disused. Before the passing of the late act, the jurisdiction in the awarding of Cessio was entirely confined to the Court of Session, and the insolvent was required to have been a month in prison before he could sue out the process. By 6 & 7 Will. IV. c. 56, the system was remodelled. The process may now be sued out either in the Court of Session or in the sheriff's local court. It may be taken advantage of by any person who is in prison for civil debt, or against whom such a writ of imprisonment has issued. It proceeds on notice to the creditors, and an examination and surrender of the insolvent. Proceedings instituted in the Sheriff Court are liable to review in the Court of Session. Cessio bonorum exhibits, like the insolvency system in England, this important difference from mercantile bankruptcy, that the person who obtains the privilege is not discharged from his debts, but only from proceedings against his person for payment of past debts, his estate continuing to be liable to the operations of his creditors. In Scotland, however, the common law means of attaching a debtor's property are simple and effectual, and there does not appear to have been there the same inducement as in England to make the process for the distribution of the debtor's effects an instrument of their discovery. The Scottish system, moreover, cannot be used by the creditors as a means of compelling their debtor to distribute his estate. It is a privilege of the debtor, and being seldom resorted to except by persons in a state of destitution who are harassed by vindictive creditors, the improvement of the system has not been a matter of much interest either among lawyers or legislators. [BANKRUPT LAWS OF SCOTLAND, P. C.; BANKRUPTCY, P. C. S.]

CESTRA'CEÆ, or CESTRI'NÆ, a natural order of plants belonging to the class of monopetalous Exogens. It is nearly related to Solanaceæ, and forms a tribe of that order in Don's Gardeners' Dictionary, with the following characters: Limb of corolla plicate, valvate or induplicate in æstivation; calyx 5-toothed; corolla funnel-shaped, 5-lobed regular; tube elongated, limb usually spreading; stamens 5; anthers dehiscing lengthwise; ovarium seated on a cupulate disk; pericarp capsular or baccate; placentas adnate to the dissepiment; embryo nearly straight with a cylindrical radicle, and roundish leafy cotyledons. It embraces the genera Cestrum, Dunalia, Meyenia, Dartus, Vestia, Lessea, Fabiana, Laureria, Lamarkia. In the second edition of the 'Natural System' Dr. Lindley recognises the order Cestraceæ, and adds, 'I do not attempt to characterise this assemblage of plants, being uncertain what its real peculiarity is. According to Schlechtendahl, it has all the characters of Solanaceæ, except that the embryo is nearly straight, and the cotyledons foliaceous. To this however it is possible that the valvate æstivation of the corolla ought to be added; but I am by no means sure that the species of Periphragmos of the Flora Peruviana with winged seeds ought not to be included, although as they have an imbricated æstivation, and a tricarpellary fruit, they are placed in Polemoniaceæ. These plants, which are very different from most of Jussieu's Cantuas, especially C. quercifolia, have much the habit of Lycium as well as Vestia. If they really do belong to Polemoniaceæ, they must be considered a connecting link between that order and Cestraceæ.' The genera recognised by Lindley are Cestrum, Vestia, Lessea, Fabiana.

The genus *Cestrum* has a tubular calyx, terete very short, obsoletely 5-toothed; corolla funnel-shaped, with a long slender cylindrical tube; a roundish throat and a flat limb, *with ovate* equal segments; filaments the length of the tube;
anthers enclosed, being roundish, 2-celled, many
venenatum is a large woody bush, which grows at
Good Hope, in Houtinqua Land, and elsewhere.
are arranged in axillary clusters; the corolla has a
and a white limb, and emits a perfume resembli
flowers. A decoction of the bark reduced to an
evaporation is employed by the Hottentots to
arrows. It is said to be a speedy poison, and
ployed to destroy wild beasts by mixing with their
macrophyllum and *C. nocturnum*, have similar prop
Hediunda and *C. lamifolium* are febrifuge, and
extensively as astringents in Peru. About fifty
Cestrum have been described. They are all of ther
North and South America, and the West India
are known by the common name of Bastard Jasmi
are easily cultivated, and will grow in any rich lig
are easily propagated by cuttings, which should be
a hand-glass in heat. The species of the allied
quire the same treatment.

(Don, *Gardeners' Dictionary*; Lindley, *Flor*
Lindley, *Natural System*.)

CESTUI QUE TRUST. [TRUST AND TRUS

CETIOSA'URUS, a new genus of large fos
adopted by Professor Owen. It occurs in the Oo
tions.

CETRA'RIA ISLANDICA—*Medical Pr*
This lichen, commonly termed Iceland moss, tho
of the higher mountains of the northern part of
procured mostly from Norway and Iceland, on the
west coast of which latter country it abounds an
large size. It is imported through Hamburg. '
is erect, tufted, olive-brown, paler on one side,
channelled, and dentato-ciliate; the fertile lacinia
apothecia brown, appressed, flat, with an elevat
(Hooper.) The apothecia are very rarely develo
thallus in Britain, save on the mountains of Ben-
Aberdeenshire, and the imported specimens rarely
probably from being gathered in a young state; for
is too important an article of food in northern cou
allowed to grow to maturity. When dry, it has s
odour, and the taste is bitter and unpleasant. The
flour is of a whitish grey.

The analysis of Berzelius gives as its constituent
matter of a peculiar kind (*lichenin*), 44·6; bitter
(*cetrarin*), 3·0; uncrystallizable sugar, 3·6; ch
1·6; extractive matter, 7·0; gum, 3·7; bi-lichenate
and lime, along with phosphate of lime, 1·9;
fibrin, 36·2.

The bitter principle, or cetrarin, may be separa
gesting the lichen in cold water containing 1-16th
nate of potass (some affirm 1-300th to be suff
twenty-four hours. The whole is then thrown up
and the liquid drained off. This liquid, when
yields a white principle, extremely bitter, very
alcohol, particularly when boiling, and æther;
so in water, volatile oils, and creasote. This
may also be separated by animal charcoal, ac
Peretti. (*Annalen der Pharmacie*, vi. p. 344.
this is removed, the starchy matter differs little f
flour in nutritive properties, though Olasson ass
soup prepared with it is twice as nutritious as one
flour. (Sparmann, *Voyage*, iii. p. 129, note.) C
that the inhabitants of Norway, Lapland, and,
of Iceland, use it extensively as an alimentary sub
latter regarding it as the gift of 'a bountiful P
which sends them bread out of very stones.' Dr.
(*Tour in Iceland*) says that a porridge made of t
flour is to a foreigner not only the most wholeso
most palatable, of all the articles of Icelandic d
submitted to no other preparation than repeated s
cold water, drying, and powdering; after which
made into cakes or boiled in milk. Unless it be
is both offensively bitter, and also to many persons
hence it has been called *lichen catharticus*. (
Act. Hafnien., 1671, p. 126.) Owing to its inte
taste, Sir John Franklin, even when pressed by hu
not use it, though the tripe de roche suited we
Journey to Shores of Polar Sea, 4to., p. 413, 414.

The excellence of Iceland moss depends upon it
and freedom from accidental impurities, which shou
fully removed before it is usod. In its natural stat
containing the bitter principle, it is tonic, stoma
fuge, demulcent, and nutritious. It has acquired

ot merely as an article of diet, but as a medicinal
nsumption. To obtain benefit from it, the use of
persisted in for a long time. This constitutes at
culty in the employment of it, and casts a doubt on
ature of the cases in which it is said to have proved
. The unpleasantness of the bitter it contains
unpalatable to most persons, and also its heating
ıfit it for those who have either much general fever,
of sub-acute inflammation of the stomach, a very
ondition in genuine phthisis pulmonalis. Hence
very reason for suspecting that in the instances
s been used for a long time and proved beneficial,
was chronic bronchitis, in which bitters and de-
e extremely useful. To disguise the disagreeable
y expedients have been had recourse to, such as
with chocolate or cocoa, and flavouring it with
er water, &c. (A full account of these may be
ufeland's *Journal*, August, 1824, p. 126, from the
Oppert. Many formulæ may be found in Geïger,
œia Universalis.) The only form officinal in
he decoction, which is frequently made the vehicle
l agents. Cetrarin has been given in a separate
succedaneum for cinchona bark, and, like many
bitter articles, is of considerable efficiency in agues.
titutes for Iceland moss have been proposed; one
of which is the Carrageen or Irish moss (*Fucus*
This, when the brackish taste is lessened by re-
pings in cold water, forms an excellent jelly, much
consumptive patients, and much cheaper than any
e *Sticta pulmonacea*, or lung-wort, is of unques-
icacy in some cases of asthma. But none are so
r agreeable as the Ceylon moss (*Fucus amylaceus*).
e procured not only from Ceylon, but abundantly
st coast of Bengal. In the form of jelly, soup,
r other mode of preparation, it not only agrees
is more relished than any jelly, either animal or
It is to be hoped that it will become a regular
ommerce.
Iceland moss imported into Britain is not used for
purposes; much was employed in baking ship-
those into the composition of which it enters are
be attacked by worms, or suffer much from sea-
Saxony, in time of scarcity, it is advantageously
vheaten flour. In some countries it is employed in

OPHYLLUM, a genus of plants belonging to the
der Umbelliferæ, to the sub-order Campylospermæ,
ibe Scandicineæ. It has an obsolete calyx, obcor-
s with an inflexed point, a fruit not beaked; carpels
equal obtuse ridges, interstices with single vittæ.
es are annual, biennial, or perennial plants with
nd leaves. Many plants formerly placed in this
now referred to Anthriscus. The *Chærophyllum*
f Linnæus is now *Anthriscus sylvestris*. It has been
edicine as a substitute for hemlock. The Chæro-
ativum of Lamarck is the Anthriscus Cerefolium of
It is the garden chervil of Great Britain, and is
me places as a pot-herb. Three species of Chæro-
re described by Babington in his recent 'Manual
Botany.' *C. temulum* has a rough stem swelling
the joints, the leaves bipinnate, the leaflets ovate,
nnatifid, with obtuse mucronate segments, glabrous
les equalling the stylopode. It is a common plant
banks in Great Britain, attaining a height of three
eet. *C. aureum* and *C. aromaticum* have been
s natives of Scotland, but it is very doubtful as to
ey have not both been introduced.
ton, *Manual of British Botany*; Lindley, *Flora*

RULE. This is the name given to a rule of
by which when a succession of equivalents is
last of each being of the same kind as the first of
a relation of equivalence is established between
f the first and last kind mentioned. Thus if 3
worth 7 cows, and 10 cows be worth 39 sheep, and
worth 53 geese, it can be found how many geese
ay 11 horses, or how many horses are worth 1000
ch questions, and the mode still adopted of solving
found in the Hindu Lilivati [P. C.], and in the
ropean books on arithmetic and algebra. They
chain of equivalents, each link of which is joined
eding and following one by the same names, and
ame of the first link is the same as the second name of the last; whence the name *chain-rule*. The process applies with great practical use to questions in the arbitration of exchanges.

The process is nothing but that of composition of ratios; but it may be simply exhibited thus:—Let it be that

3 horses	are worth	7 cows
10 cows	,,	39 sheep
2 sheep	,,	53 geese,
How many geese	,,	11 horses?

From the first, 3 × 10 horses are worth 7 × 10 cows, which from the second, are worth 7 × 39 sheep: hence 2 × 3 × 10 horses are worth 2 × 7 × 39 sheep or 53 × 7 × 39 geese. Hence 2 × 3 × 10 × 11 horses are worth 53 × 7 × 39 × 11 geese, or 11 horses are worth 53 × 7 × 39 × 11 ÷ 2 × 3 × 10 geese. By such reasoning the following rule is established:—divide the product of the numbers in the column which has no vacancy by the product of the numbers in the column which has a vacancy for the unknown quantity, and the quotient is the number with which the vacancy is to be filled up.

It is obvious that any multiplier which exists in both columns may be struck out before commencing the process: this is the peculiar advantage of the rule, namely, that it points out at once all the simplifications which can be introduced by division.

The common rule of three, and various other rules, may be brought under the chain rule; but an attempt is sometimes made to reduce under it every question the answer to which is found by dividing one product by another. This has been done in all times, from that of the Lilivati to the present. For example, if 7 men can reap 3 acres in 10 days, how long will it take 13 men to reap 19 acres? The answer is found no doubt by dividing 7 × 19 × 10 by 13 × 3; but if we attempt to put these down in the chain form we have

10 days	3 acres
19 acres	13 men
7 men	? days

Now even if we grant that 10 days are, in the first clause, an equivalent for (being the time of reaping) 3 acres, and that 19 acres are in the second clause an equivalent for (or the work of) 13 men: we still find it impossible to make out in what sense the 7 men of the first clause are an equivalent to the unknown number of days in the second. But in truth the 10 days in the first clause are not absolutely and independently the time of doing the 3 acres, but only on condition that 7 men are employed; while in the second clause the 13 men are only the reapers of 19 acres on the supposition of some one definite but unknown time being allowed. The question is not therefore of the same class as that which was first proposed, in which each quantity mentioned was absolutely and unconditionally an equivalent in value to one of the others.

CHALI'COMYS, a genus of rodent Mammalia, allied to the beaver, from Eppelsheim, in tertiary beds.

CHAMBERS, GEORGE. This excellent painter of shipping was the son of a poor seaman of Whitby in Yorkshire, where he was born towards the close of the last century. After he had attended for a short time the free-school of his native town, he was sent, at the age of ten years, to sea in a small trading sloop, in which he served as cabin-boy for two years. He was afterwards bound apprentice to the master of a brig which traded in the Mediterranean and the Baltic seas. During this apprenticeship he gave evidence of that talent for which he was subsequently distinguished, by making sketches of various descriptions of shipping, for the amusement and gratification of the seamen. His master, Mr. Storr, appears to have been induced by these efforts to cancel his indentures, and Chambers worked his way home to Whitby in another vessel, with the determination of becoming a painter of ships. At Whitby he knew no better way of making himself acquainted with colours than by apprenticing himself to an old woman who kept a painter's shop. But at the same time that he was plodding his way through the business of a house-painter, he took lessons from an obscure drawing-master of Whitby, of the name of Bird, and applied what time he had to spare in painting small pictures of shipping, for which he found, at his humble prices, a ready market. He carried on this life for three years, when, being anxious to visit London, he again entered the seafaring life, and worked his way as a foremast-man in a trading vessel to the great metropolis.

In London, though very poor, he refused an offer of employment as a journeyman house-painter at thirty shillings per week, being bent upon painting shipping; and he shortly contrived to obtain considerable employment in the representation of ships. Having obtained however an introduction to Mr. Horner, that gentleman employed him for seven years on the great panorama of London at the Colosseum. At the completion of this work he was engaged as scene-painter at the Pavilion Theatre. While at this theatre some of his works attracted the notice of Vice-Admiral Lord Mark Kerr, who became Chambers's sincere patron, and procured him an introduction to King William IV. and Queen Adelaide, who appointed him their marine painter. He was ordered to attend at Windsor Castle with his portfolio of drawings, and the following account of his interview with the sailor-king and his queen is given in a memoir of Chambers which was published at Whitby. He was first ushered to Sir Herbert Taylor, the king's private secretary, who eased his mind by telling him that no ceremonious formalities would be required of him, and then introduced him to their majesties. They looked over his sketches for a choice of subjects: the king chose a stormy scene, which the queen objected to as too dismal, when the sailor-king observed, 'in the blunt phraseology of an old commodore, "Oh ma'am, we sailors like those boisterous scenes the best—eh! Mr. Chambers?"' The king chose a sea-fight, and the queen chose a calm coast scene near Dover. Chambers painted also a view of Greenwich Hospital for the queen, and the Opening of New London Bridge for the king.

He was now reaping the fruits of his persevering industry; he had given up his appointment as scene-painter to the Pavilion Theatre, and he was in a fair way of establishing fame and fortune together; but a constitution originally very weak, and much shattered by a seafaring life, was unable to bear the incessant application his ambitious mind subjected it to; and at that great and trying crisis—the transition from indigence, obscurity, and slavery, to honour and affluence—his remaining strength gave way, and he gradually fell into a disease which proved fatal to him: he died of aneurism of the aorta, in October, 1840, leaving a wife and three children.

Chambers's pictures are now beginning to be valued by collectors, though few appreciated them during his life time. He was a member of the Society of Painters in Water-Colours, in which style he drew with great elegance and effect. His chief productions however are his naval battles in oil, in which he was excellent, especially in the construction and rigging of his ships, though in his colouring there is an unnatural redness of effect pervading everything, the smoke in particular. There are in the hall of Greenwich Hospital three battles by Chambers: The Bombardment of Algiers by the squadron led by Viscount Exmouth, G.C.B., in 1816, presented in 1836 by the admiral's friends; Portobello taken by Admiral Vernon and Commodore Brown in 1739, presented in 1839 by E. H. Locker, Esq., commissioner; and a copy of West's picture of the destruction of the French fleet in the port of La Hogue by Vice-Admiral Sir George Rooke, Kt., in 1692.

(*Art-Union Journal*, December, 1840; *Catalogue of the Naval Gallery of Greenwich Hospital.*)

CHAMISSO, ADELBERT VON, a distinguished poet, naturalist, and traveller, was born on the 27th of January, 1781, in the château of Boncourt in Champagne. He belonged to a very ancient noble family of Lorraine. Until the outbreak of the French revolution the family lived quietly on their estate, and Adelbert's brother Charles was one of the pages of Louis XVI., to whom he remained faithful to the last, and for whom he risked his life on several occasions. In 1790 the château Boncourt was rased to the ground, whereupon the family of the Chamissos quitted France; and after having wandered about in the Netherlands and the south of Germany, they ultimately went to Berlin, in 1796, where, together with other French emigrants, they took up their permanent residence. As they had lost all their property, the whole family lived upon the little income which two of the sons made by painting miniature portraits. Adelbert however was extremely fortunate; the queen of Prussia made him one of her pages, and took great care of his education, which he received in one of the gymnasiums of Berlin. He made himself thoroughly acquainted with the German language and literature, and the spirit which pervades all his own literary productions shows that he became so completely Germanized that the peculiarities of the German mind, which are most foreign to the French, were in him most prominent. In 1798 he entered the Prussian army, and his parents accepting the offer of Napoleon, then First Consul, returned to France. Shortly after this he began writing poetry in German, and from 1804 to 1806 he
edited a 'Musen-almanach,' conjointly with Varn
Ense. After the peace of Tilsit Chamisso quitted t
service, and in 1810 he returned to France, where
had recovered a great part of their property. For
he was teacher in a school at Napoléonville; but h
feelings and the friendships he had formed in Ger
him back to that country. He now devoted him
entirely to the study of the natural sciences. I
wrote for the amusement of the children of
little book called 'Peter Schlemil,' containing the
man who loses his shadow. This amusing little w
has been translated into English and most other
languages, was first published in Germany by
friend de la Motte Fouqué (1814), which has led so
to look upon it as the production of Fouqué. A sec
accompanied by some lyric poems and ballads was p
the author himself in 1827. In 1814 Count Rumjan
cellor of the Russian empire, prepared an exploring
round the world at his own expense. He invited C
accompany the expedition as naturalist, and the in
gladly accepted. In 1815 Chamisso embarked at
under Captain Kotzebue; and returned thither in
of the main objects of the expedition had been th
of a north-east passage, in which the expedition fail
all other respects the discoveries were highly satisf
account of the voyage was published by Kotze
volumes, and Chamisso himself published 'Bemerk
Ansichten auf einer Reise um die Welt,' Weimar,
which forms an indispensable supplement to Kotze
and contains a most faithful account of everything
within the range of his personal observation. Afte
from this voyage Chamisso again took up his r
Berlin; the university conferred upon him the
doctor in philosophy; he became a member of
Academy of Sciences, and soon after he received t
ment of inspector of the botanical gardens of the
While in this situation he wrote a botanical work, '
der in Norddeutschland vorkommenden nützlichsten
lichsten Gewächse, nebst Ansichten über das Pf
und Pflanzenkunde,' Berlin, 1827. These subject
did not estrange him from the cultivation of poetry;
the last ten years of his life he produced a great
small poems, many of which, especially his popul
and ballads, belong to the best productions of t
German literature. He died on the 21st of Augu
Berlin. His poems were collected and published
Leipzig, 1831, in 1 vol. 8vo, and a second edition
1834. A collection of all his works, both in p
verse, was published at Leipzig in 4 vols. 8vo, 1
second edition in 1842 in 6 vols. 12mo, the two la
contain Chamisso's life and correspondence edite
Hitzig.

CHAMOMILE. [Anthemis Nobilis, P. C.

CHANCELLOR of a CHURCH, or a D
or a CATHEDRAL. [Chancellor, P. C.]

CHANCELLOR of the DUCHY of LAN
[Chancellor, P. C.]

CHANCELLORS of the UNIVERSITIE
FORD and CAMBRIDGE. [Chancellor, P.

CHANCELLOR of the EXCHEQUER. [
lor, P. C.]

CHANNING, WILLIAM ELLERY, D.D.
son of an eminent merchant of Newport, Rho
United States; and the grandson, through his
suppose, of William Ellery, whose name appears
of the other delegates to the Congress of 1776
signatures to the Declaration of Independence, and
was extended to the year 1820, when he died at
ninety-two. Ellery, it is stated, kept up the
reading every morning a chapter or two of the G
Testament till he was upwards of ninety; and
powers in general remained vigorous almost to t
circumstance which he used himself to attribute to
verance in regularly exercising them. Channing w
Newport in 1780 o 1781. He was educated a
College, and his first views are said to have been
the medical profession; but he was eventually indu
lectures or advice of the Hollis professor of divinit
the ministry in the Unitarian communion, which he
scarcely as yet distinguished in the United State
name, and at any rate was not separated in respect
from what is commonly called orthodox Christia
clear a line as now. Soon after taking his degree,

about the end of the century, he went to Virginia, and spent some time there as a teacher. But in 1803 he was appointed to the office in which he remained for the rest of his life, that of pastor of the Federal Street congregation in Boston. At this time he was considered to lean to what are called evangelical views; and several of the neighbouring clergymen of other persuasions used occasionally to preach from his pulpit. His own preaching early drew attention by its superior polish and eloquence; but not, it would appear, to any remarkable degree till he had officiated for some years, when his theology assumed a more decided character, and his congregation, having considerably increased, built him a larger church, and gave him a colleague, the Rev. Mr. Gannett. What first brought him into general notice in his own country were several sermons which he published during the war of 1812. These were followed by a number of papers in the 'Christian Disciple,' the 'Christian Examiner,' and perhaps other Boston reviews or magazines. In England however Dr. Channing's name was not much heard of till after the appearance of his 'Remarks on the Character and Writings of John Milton,' originally published in the form of a review of the 'Treatise of Christian Doctrine' in the Christian Examiner for 1826. In the same publication for 1829 appeared his 'Remarks on the Life and Character of Napoleon Bonaparte,' as a review of Scott's Life of Napoleon. In 1830 a collection of Channing's writings was published in a royal 8vo. volume at Boston, under the title of 'Reviews, Discourses, and Miscellanies.' He continued to produce occasional tracts, discourses, and other writings during the remainder of his life, of which several subsequent collections were formed, both in America and in England; but the most complete we believe is that published at Glasgow, in 6 vols. 8vo., of which the first five were brought out in 1840, with the sanction and assistance of Dr. Channing himself, and the sixth in 1844 under the authority of his son Mr. W. F. Channing. The subjects principally treated of, besides those already mentioned, are war, temperance, public education, the church, and especially the abolition of negro slavery, of which measure Channing was one of the warmest advocates, though he belonged, we are told, to no anti-slavery society, and even doubted the wisdom of these associations. His death took place at Burlington, Vermont, 2nd October, 1842.

Channing is one of the most striking writers America has produced; and his works, besides their attractions of style, are all animated by a pure and lofty moral spirit. His eloquence however, though often imposing, has not much nature or real fire; its splendour is mostly verbal; the thoughts are true and just, rather than new or profound; it is exciting on a first perusal, but will hardly bear a second. Nothing that he has written therefore has much chance of long retaining its reputation: there is too little in it of the spirit of life; too little of anything that can be called its own, and that is not to be found elsewhere. Both in its rhetorical character however and in its strain of sentiment, it was well calculated to produce an immediate effect. In a brief notice of Dr. Channing in the 'Gentleman's Magazine' for December, 1842, to which we have been indebted for most of the few facts we have been able to give, but which is rather a eulogy than a memoir, it is stated that his elocution was peculiar, and his gravity and solemnity in the pulpit greater than that of the generality of preachers. In early life, though small in stature and of a light frame, he was considered an athletic young man; but his health suffered from exposure or neglect when he was in Virginia, and was never afterwards so robust as it had been.

(*Gentleman's Magazine*; Dr. Channing, *Works*.)

CHANTREY, SIR FRANCIS, was born on the 7th of April, 1782, at Norton, in Derbyshire, where his father was a farmer. Chantrey's father wished to make an attorney of him, but he preferred being an artist, and his predilection was for carving. He was accordingly bound for three years to a carver at Sheffield; but during the time of his apprenticeship he found that it was a style of work which did uit him, as, in the situation in which he was placed, its ere was too circumscribed to admit of any great display of nality, or an adequate gratification of a true love for art. therefore turned his attention to modelling in clay; and tried his fortune as a modeller, first in Dublin, then in nburgh, and lastly in London: the reason probably of trying London last was an impression that in the great capital he would have so many more able rivals to compete with, and that his chance of success there was comparatively hopeless. In London, Nollekens was greatly instrumental in promoting Chantrey's fortunes. The young sculptor (he was then four and twenty) sent a bust of J. R. Smith to the exhibition of the Royal Academy, which, in the disposition of the works for exhibition, attracted the admiration of Nollekens, who said:—'It is a splendid work; let the man be known: remove one of my busts, and put this in its place.' Nollekens himself did all that was in his power to make him known: he recommended Chantrey upon all occasions when a bust was required. Chantrey however, having once found the opportunity of making himself known, required thenceforth no other recommendation than his busts to ensure himself full employment in that department of art. In 1816 he was chosen an Associate, and in 1818 a Member, of the Royal Academy. In the following year, 1819, he paid his first visit to Italy, where he was elected a member of the academies of Rome and Florence.

In the career of a uniformly successful artist there are few incidents to record: Chantrey's career for the last twenty years of his life, as a monumental sculptor, was unrivalled; beyond this sphere however he did not range. He was knighted by the queen in 1837, at which period he was already a sufferer from disease of the heart, and from this time he finished few works himself: their completion was entrusted to his able assistant Mr. Weekes. Of his poetic works, which are not many, few were executed from his own designs: the statue of Lady Louisa Russell, daughter of the late duke of Bedford, at Woburn Abbey, and the Sleeping Children, in the Cathedral of Lichfield, his best sepulchral monument, were both executed from the designs of Stothard: the first is a child on tiptoe, pressing a dove to her bosom; the second is a monument to two children of the late W. Robinson, Esq. There are also in Woburn Abbey two reliefs from Homer by Chantrey—the Parting of Hector and Andromache, and Penelope with the bow of Ulysses; but they are calculated rather to detract from his reputation, or, in other words, are evidence that poetic art was beyond his sphere. They are engraved in plates xxix. and xxx. of the 'Outline Engravings and descriptions of the Woburn Abbey Marbles.' Dr. Waagen terms them stiff and styleless productions; and he speaks still more severely of the statue of Lady Louisa Russell.

As a monumental sculptor Chantrey will rank high: some of his statues in this branch of art are among the finest specimens of their class. One of his very best works is the bronze statue of William Pitt, in Hanover Square, London. There are also marble statues by him, in Westminster Abbey, of Francis Horner, Sir T. S. Raffles, George Canning, Rev. E. F. Sutton, and Sir John Malcolm. Among his principal works are also statues of Washington, in the state-house at Boston, United States; Spencer Perceval, in All Saints' Church, Northampton; James Watt, in the church of Aston, near Birmingham; Sir Edward Hyde East and Bishop Heber, at Calcutta; Canning, in the town-hall of Liverpool; Mountstuart Elphinstone and Sir Charles Forbes, at Bombay; Dr. Ryder, bishop of Lichfield and Coventry, in Lichfield Cathedral; and Dr. Bathurst, bishop of Norwich, in Norwich Cathedral. His busts are extremely numerous; his sitters were a large proportion of the persons of rank and distinction of his time. He executed also some equestrian statues in bronze, but few, and they are not of the highest merit; their postures are formal and want vigour: the horses are particularly inanimate in the body and limbs. His last work of this class, the Wellington testimonial, now placed before the new Royal Exchange, London, was executed nearly entirely by Mr. Weekes.

Though deservedly eminent in his style, and certainly one of the best sculptors of his time, Chantrey cannot be reckoned among great sculptors; his busts display no extraordinary powers of expression or of modelling, and the best of his statues are but simple draped figures in repose, well proportioned and well planted on their legs; but they are not superior to similar works by many sculptors of less renown. Chantrey's personal appearance was an index, not of what was, but of what was not to be found in his works; he was rather stout, and his countenance was broad and chiefly remarkable for good humour and jovialty, indicative of little poetry or imagination, and less sentiment. Whenever he had a commission which involved more than portraiture, he is said to have habituall had recourse to some friend more familiar with such subjects for the design. In the treatment of his portraits however h always disposed the unpicturesque costume of the present d with the greatest judgment and with the least possible inju to the proportions of the human figure; he never left the stiff or stony, as they are on many of the statues in St. Paul's Cathedral, executed by some of Chantrey's contemporaries and immediate predecessors.

Chantrey had no children or very near relations, and he left the reversion of a portion of his property, at the death or second marriage of his wife, to the disposal, under certain restrictions, of the president and council of the Royal Academy of Arts in London, for the promotion of British Fine Art in painting and sculpture, including an annuity of 300*l*. for the president and of 50*l*. for the secretary, payable on the 1st of January in every year. The interest of the residue is to be laid out in the purchase of works of Fine Art of the highest merit in painting and sculpture that can be obtained, either already executed or which may hereafter be executed by artists of any nation, provided such artists shall have actually resided in Great Britain during the executing and completing of such works; it being his express direction that no work of art shall be purchased unless it shall have been executed within the shores of Great Britain: and further, that in making such purchases, the works of the highest merit shall be chosen, solely with regard to their intrinsic merit, and a liberal price be paid, wholly at the discretion of the president and council of the Royal Academy. The president and council however will not be obliged to lay out annually the whole or any part of the annual sum at their disposal, which may be allowed to accumulate for not more than five years. All purchases must be bonâ fide purchases of finished works. The will expressly provides against commissioning any artist whatever to execute works; and all purchases must be publicly exhibited for at least one month, at the annual exhibition of the Royal Academy or elsewhere.

All these purchases are to be collected for the purpose of forming and establishing a 'Public National Collection of British Fine Art in Painting and Sculpture,' executed within the shores of Great Britain. The will provides also against any expenditure of these funds in the erection of a building to contain permanently the works thus purchased; it having been Chantrey's expectation that such building would be provided by the nation free of all charge upon his estate. In case of the complete dissolution of the Royal Academy, the trustees of the estate are empowered by the will to petition parliament to carry out the same object. The property devoted by Sir Francis Chantrey to this purpose is his residuary personal estate, over and above the property bequeathed to his wife, and all legacies; but he expresses a wish that at the decease of his wife all the property bequeathed to her should be by her devoted to the same purpose. Lady Chantrey however, so long as she remains a widow, has a life-interest in this residuary personal estate: its amount is not publicly known, but it is said to be about 2500*l*. per annum; it is vested in five trustees, including the president and treasurer of the Royal Academy. Chantrey left to his friend and principal assistant Allan Cunningham 2000*l*., and, in a codicil, a life-annuity of 100*l*., and, in case of his death, to his widow. He left also to his assistant Henry Weekes, 1000*l*.; provided in both cases that they continued in their offices as assistants, until the completion of his unfinished works, or such as it was necessary to finish. Allan Cunningham however did not survive Chantrey an entire year: Chantrey died on the 25th of November, 1841; Cunningham died on the 5th of November, 1842. Chantrey and Cunningham were great friends, and when Chantrey was building his mausoleum, he said to the poet that he would make the vault large enough to contain him also: 'No,' said Allan Cunningham, 'I should not like, even when I am dead, to be so shut up. I would far rather rest where the daisies will grow over my head.'

Chantrey was buried in a vault constructed by himself in the church of his native place, Norton in Derbyshire, and he bequeathed 200*l*. per annum to the clergyman of the place, so long as his tomb shall last, to instruct ten poor boys, and to pay annually 10*l*. to five poor men, and to five poor widows or unmarried women, selected by the clergyman, and being of the parish of Norton; the residue to be reserved by the clergyman for his own use in consideration of his trouble.

(*Art-Union Journal*, 1842; *Catalogues of the Exhibitions of the Royal Academy*; Waagen, *Künstler und Kunstwerke in England*.)

CHAPMAN, GEORGE, the earliest English translator of Homer, and known also as a prolific writer of dramas, was born in the year 1557. His birth-place is uncertain. Some have supposed him to have been a native of Hertfordshire, in which county, at Hitching-hill, he is known to have for some time resided. [illegible]es him to have been of a Kentish family. The same writer asserts that he studied a and that, although eminent in classics, he neglected ph a fact which has been referred to as accounting for of an academical degree. Coming to London, he en ranks of the professional authors, and became an member of the best literary society, associating with with Daniel, and with Shakspere, who was six or se his junior. He was patronised by Sir Thomas Wa and his son, by Henry Prince of Wales, and by Som royal favourite. The death of the prince, and the f minion, may be supposed to have had an unfavou fluence on his position; and even before these events C with Ben Jonson and Marston, had narrowly escape punishment for satirical reflections on the Scotch, con their comedy of 'Eastward Ho!' But, although the lars of Chapman's history are little known, it is u that he held some place about court; and there is no of his having ever laboured under those pecuniary which mark so painfully the biography of some of hi contemporaries. His personal character, too, appear been both respectable and amiable. Jonson de Drummond that he loved Chapman; and Anthor asserts him to have been 'a person of most reveren religious and temperate, qualities rarely meeting in He attained to a ripe old age, and died in Londo 12th of May, 1634. He was buried in the churc St. Giles-in-the-fields, where his friend Inigo Jones monument to his memory.

Chapman's published writings were numerous. his non-dramatic productions, the most valuable, a ambitious, was his famous translation of Homer int fourteen-syllable verse. Seven books of his Iliad a 1598; twelve books appeared in folio about 1600; the accession of King James in 1603, there was pu folio the complete translation: 'The Iliads of Hom of Poets, never before in any language truly transl a comment upon some of his chief places, done acc the Greek by George Chapman.' Of this work a r recently appeared, with introduction and notes, b Cooke Taylor, London, 1843, 2 vols. 12mo. The similarly translated, appeared in 1614, and was fo the same year by the 'Battle of the Frogs and M the Homeric Hymns and Epigrams. The follow Chapman's other non-dramatic works, original and t —1, 'The Shadow of Night, containing two Hymnes,' 1594, 4to. 2, 'Ovid's Banquet of Sen 4to. 3, 'Hero and Leander, begun by Ch. Ma finished by George Chapman,' 1606, 4to. 4, ' Raptus, or the Tears of Peace,' 1609, 4to. 5, 'Ar or Funeral Song, on the most disastrous Death of born Prince of Men, Henry Prince of Wales,' 161 'Andromeda Liberata, or the Nuptialls of Perseus dromeda,' 1614, 4to. 7, 'The Georgicks of H George Chapman, translated elaborately out of th 1618, 4to. 8, 'Pro Vere Autumni Lacrymæ, to morie of Sir Horatio Vere,' 1622, 4to. 9, 'A Ju of a strange action of Nero, &c.; also a Just Re Roman Smell-Feast, being the Fifth Satyre of 1629, 4to.

The following are the titles of Chapman's plays, dates of their printing:—1, 'The Blind Beggar o dria,' a comedy, 1598. 2, 'An Humourous Day' a comedy, 1599. 3, 'All Fools,' a comedy; and ward Ho,' a comedy, 1605 (by Chapman, Jon Marston); both reprinted in Dodsley's collection. Gentleman Usher,' a comedy, 1606; 6, 'Monsieur a comedy, 1606; and 7, 'Bussy d'Ambois,' a trage all the three reprinted in Dilke's Old English 'Cæsar and Pompey,' a tragedy, 1607. 9, and Conspiracy and Tragedy of Byron,' two tragedi 11, 'May Day,' a comedy, 1611; reprinted i collection. 12. 'The Widow's Tears,' a comed reprinted in Dodsley's collection. 13, 'The of Bussy d'Ambois,' a tragedy, 1613, in Dil lection. 14, 'The Masque of the Inns of Cour 15, 'Two Wise Men and all the rest Fools,' a 1619. 16, 'The Tragedy of Alphonsus, Em Germany,' 1654. 17, 'Revenge for Honour,' a 1654. 18 and 19, 'The Ball,' a comedy, and 'Ch miral of France,' a tragedy, both printed in 1639 of Chapman and Shirley, and reprinted in the mode of Shirley's works by Gifford, who pronounces Ch have plainly had the principal share in their con

many speculations as to the authorship of the
'The Two Noble Kinsmen,' in which Shak-
een asserted to have assisted Fletcher, Mr.
is editions of the great poet's works, has con-
the parts attributed to him may really have been
Chapman.

dramas, although works of much significance in
our old literature, are not the most valuable of
They are among the many productions of his
ere written by men tempted, through the fashion
to a walk of composition for which they were
tly qualified. In comedy, which had been
a native school more completely than tragedy,
pts himself readily, and not without success, to
of his juniors, especially Jonson and Fletcher;
es to the tone of his works not unfrequently
f thought and a fulness of descriptive imagery
ome amends for the pervading stiffness of his
character and the forced and artificial turn of
In his tragic dramas he is, in point of plan
mi-classic. He attempts at once to gratify the
ge and nation for the direct and vivid repre-
ramatic horrors, and to maintain that tone of
amation and of didactic reflection which Seneca
im, and to which his cast of mind made him
e. The latter part of his 'Byron' is, as we ven-
the best of his tragedies, and might better have
inting than the extravagant 'Bussy D'Ambois.'
's memory is best preserved, and his reputation
imaginer and thinker most fully vindicated, by
lations from the Greek, and especially by his
igorous version of the Iliad. The late republi-
fine old poem is a judicious tribute to the im-
f our time in poetical literature. His Iliad, like
deformed by many faults. It is as unequal as
leed, he himself, on completing the work, re-
t book entirely, and altered very much the other
d previously been published. But his patience
ient, either for correcting adequately what he
written, or for carrying him carefully through
of his task: the last twelve books were trans-
n less than fifteen weeks. And again, indolence
agination concurred in tempting him to desert,
s, the sense of his author, and to paint elabo-
s for which Homer hardly gave him even the
or vigour of fancy, for a loose kind of faithfulness
f the original, for constant strength and frequent
tion, the work is one of the finest poems which
possesses. When Pope, who carefully read it,
as a work which Homer might have written
g at years of discretion, his fastidious taste
do the old poet less justice than that which
lered by Waller, who confessed that he could
apman's Iliad without a degree of rapture.

, RENT. [RENT, P. C., p. 394.]

IUS, AURE'LIUS ARCA'DIUS, a Roman
supposed to have lived about the time of Con-
reat. It is certain that he lived at least after
hom he quotes. Modestinus lived under the
exander Severus (A.D. 222—235). Charisius
Libellorum Supplicum, a keeper of petitions, as
the title of an excerpt from his own writings.
11.) He wrote a work, in one book, 'De Tes-
, in one book, 'De Officio Praefecto Praetorio;'
one book, 'De Muneribus Civilibus' (*Index*

s contain some words that are perhaps not used
jurists, as 'regimenta,' 'incunctabile.' (*Dig.*
21.) His style and the words that he uses
him to be one of the latest of the Roman jurists.
that Charisius was a Christian; but the proof is

a few excerpts from the three works of Charisius
. [JUSTINIAN'S LEGISLATION, P. C.]

S X., King of France (CHARLES PHI-
nte d'Artois), born at Versailles, in October,
the youngest son of the Dauphin, grandson
, and brother of Louis XVI. His title, as a
r of the Royal family, was Comte d'Artois.
e la Vauguyon was appointed tutor to him, as
is brothers, and he selected for their teachers
s and abbés.

rried, in the year 1773, Maria Theresa of Savoy, sister to the wife of his brother, afterwards Louis XVIII. His youth was dissipated and stormy, and he fought a duel with the Duke of Bourbon in consequence of a quarrel between them at the opera. When the disturbances which preceded the Revolution began, the Count d'Artois showed himself from the first opposed to concession, and he remained consistent in his opposition throughout the whole period of the Revolution, whilst his brother Louis, Count of Provence, afterwards Louis XVIII., seemed to court popularity, and took pains to please the Constitutional party. Charles was one of the first to emigrate: he left France in July, 1789, after the first popular insurrection and the destruction of the Bastille. He repaired to Turin, and from thence went to Vienna, and lastly to Pilnitz, where he attended the first congress of princes assembled to oppose the French revolution. After Louis XVI. had accepted the constitution in 1791, he invited the Count d'Artois to return to France, which he, in concert with his brother the Count of Provence, who had now joined him at Coblenz, refused to do, and they gave their reasons in a kind of manifesto. In consequence of this, the Legislative Assembly stopped his allowance on the civil list, and ordered the seizure of his property, in May, 1792. The war having broken out, the Count d'Artois assumed the command of a body of emigrants, who acted in concert with the Prussian and Austrian armies on the Rhine. After the execution of Louis XVI. the Count d'Artois repaired to Russia, where he received fair promises from Catherine, but no efficient assistance. He then made an attempt on the coast of Britanny, but soon after returned to England, and went to reside in Edinburgh, where he remained some years. In 1809 he rejoined his brother, who had assumed the title of Louis XVIII., at Hartwell. In 1814 he went to Germany to wait for the events. After Napoleon's abdication, he entered France with the title of Lieutenant-General of the Kingdom, and issued a proclamation to the French, in which he promised liberty and order, the reign of the law, the abolition of the conscription, and of the 'droits réunis,' and an entire forgetfulness of the past. He entered Paris on the 12th of April, 1814, attended by a body of national guards. The Senate acknowledged his authority, in expectation of the arrival of Louis XVIII. He told the Senate that his brother was determined to reign as a constitutional king, with two chambers, and to grant individual liberty and the liberty of the press. When Louis XVIII. arrived in Paris, the Count d'Artois, whose title was now that of 'Monsieur,' was made Colonel-General of the National Guards. In March, 1815, he was obliged to leave France with the king, in consequence of Bonaparte's return from Elba, but he went back after the battle of Waterloo. In February, 1820, he lost his second son, the Duke of Berry, in whom the hopes of the family were centred, by the hand of a fanatical assassin. His elder son, the Duke of Angoulême, who had married his cousin, the daughter of Louis XVI., was childless. The Duke de Berry left only one daughter, but several months after his death his widow was delivered of a son, who is the present Duke of Bordeaux.

Louis XVIII. died the 16th of September, 1824, and Charles X. was proclaimed king. On the 27th he made his entrance into Paris in the midst of acclamations. One of his first acts was an ordinance abolishing the censorship of the newspapers and other periodicals, which had been re-established by an ordinance of his predecessor in the previous month of August. This threw over him a momentary gleam of popularity, but there was a strong party, or rather a combination of parties, which disliked and mistrusted him from the first, and which in fact had all along looked upon the restoration of the Bourbon dynasty as a mere state of transition. All parties in France were acting at that time, and some of their more plain-speaking organs have since justly styled the period of the restoration as a 'fifteen years' comedy,' a comedy which however terminated in a tragedy. In April, 1825, a project of a law, or bill, was laid by ministers before the Chambers, against the guilt of sacrilege, awarding the penalty of death for the profanation of the consecrated host, and other severe penalties for the profanation of the sacred utensils, of churches, &c. The law was passed, but it had a bad effect on public opinion. By another law an annual sum of thirty millions of francs was charged on the national debt, to be distributed as an indemnity among the emigrants whose property had been confiscated. In April, 1826, a declaration signed by most of the archbishops and bishops of France was presented to the king, denouncing all attempts to subject the temporal authority of kings to the papal power, a principle always reprobated by the Gallican Church. In 1827 a law was passed against the slave-trade, which contained, against those engaged in it, the penalties of banishment, fines, and confiscation. In the same session a bill was presented by ministers concerning the 'police of the press,' by which no pamphlet of less than 21 sheets could be sold until five days after the prescribed copies had been deposited before the proper authorities. Editors of periodical papers were to declare the names of all the proprietors of the papers, and give security to a heavy amount. Under the third head of the bill, severe penalties were inflicted for offences of the press against the person of the king, the royal dignity, the religion of the state, and other communions acknowledged by the state, foreign sovereigns and princes, the courts of justice, &c. After a warm debate, ministers thought proper to withdraw their bill. This created a lively sensation in Paris. Soon after, at a grand review of the national guards, Charles X. was saluted by cries from the ranks, of 'Down with the Ministers,' 'Down with the Jesuits.' The king looking on some of the most clamorous, told them firmly, 'I am come here to receive homage, and not lessons.' He then disbanded the national guards. In June of that year the previous censorship of journals and other periodicals was re-established by an ordinance. In November the king dissolved the House of Deputies, and directed new elections to be proceeded with. He then took off again the censorship of the journals. By another ordinance he created seventy-six new peers. In January, 1828, a new ministry was formed. MM. Villele, Peyronnet, Corbière, &c. gave in their resignations, and were succeeded by Viscount Martignac, and Counts de la Ferronnays, Portalis, and others. This change was considered as a sort of concession to liberal principles. A commission was appointed, at the suggestion of the new ministry, to frame a project of municipal administration for all France. Another commission was formed to inquire into the discipline and method of education which prevailed in the 'petits Séminaires,' or colleges for clerical students, which were said to have fallen under the direction of disguised Jesuits, as the Society of the Jesuits was not authorised by the laws of France. For years past, this real or pretended fear of the Jesuits had become a favourite topic of declamation for the organs of the opposition. The political importance of the Jesuits was ludicrously exaggerated; many people, who really knew nothing about the Jesuits, fancied these mysterious beings to be lurking everywhere—about the court, in every college, in every department of the state: 'Down with the Jesuits' was the rallying cry of the day, as 'Down with the aristocrats' in the first Revolution.

The king's speech at the opening of the session of 1828 was conciliatory. A law was passed in the Chambers concerning newspapers and other periodicals, fixing the amount of security to be given by the proprietors, and enacting other regulations for the police of the press. The commission on the clerical seminaries having made its report, stating that seven or eight of those establishments were actually under the direction of members of the Society of Jesuits, the king issued an ordinance placing the establishments thus specified under the jurisdiction of the University, and ordering that in future no director or teacher should be admitted in any clerical seminary, unless he declared in writing that he did not belong to any of the religious congregations not legally established in France.

In 1829 an elaborate project of a new municipal law was laid before the Chambers by the Martignac ministry. Under Napoleon the communal or municipal councils were no longer elective; the emperor and the prefects appointed to all municipal offices, and the financial administration of the communes was regulated at Paris. It was a system of despotism extending to the smallest details. The ministers of Charles X. proposed to apply the elective system with a property qualification to the formation of the municipal councils, and to restore to them the administration of their local interests, their decisions however being subject to the sanction of the prefect. This was no small boon in favour of municipal liberty, but party spirit rejected it. The so-called liberals thought that it did not go far enough, the exclusive royalists that it went too far, and between them the bill was strangled, and ministers withdrew it. This was a fatal blow to the [illegible] rtignac administration; it alienated the mind of the king, [illegible] de him resolve upon trying a ministry of decided [illegible] ew ministry was appointed in August, [illegible] s had been prorogued. It consisted
of Prince Polignac, MM. Montbel, Haussez, La
naye, Guernon Rainville, and others. As soon a
appointments were known, a loud outcry was set
newspapers, who seemed determined that the ki
dismiss the obnoxious ministers. Associations we
with the object of refusing to pay the taxes. Pr
were instituted by the king's attorneys against
violent journals, but in several instances the courts
the accused. Meantime the country was thriving
ministers were effecting retrenchments, and propos
responding reduction of taxation.

On the 2nd of March, 1830, Charles X. opened
bers. He spoke of his friendly relations with t
powers, of the final emancipation of Greece, of the
expedition against Algiers, and he lastly expresse
resolve to transmit to his successors the unimpaired
the crown, which, he said, constituted the best sa
the public liberties secured by the Charter. In re
speech, the address voted in the Chamber of Dep
majority of forty, told the king plainly that his mi
not the confidence of the representatives of the nat
deputies who voted this address were 221 in num
king, on receiving the address, said that he had
expect the support of both the Chambers, in order
the good which he intended, but that his heart was
find that the deputies of the departments declare
their part, this support did not exist. His resolut
ever were immoveable. His ministers would let t
his intentions. The next day, the 19th of March,
ber was prorogued to the 1st of September, and
after a dissolution was proclaimed, and new elec
made. During the spring incendiary fires bro
Normandy and other provinces, and the suffe
mostly small farmers and cottagers. Among those
seized as guilty of incendiarism, the majority we
Suspicions and mutual accusations were bandied
one political party to the other concerning these f
clue was obtained as to the real instigators. The
tions increased the opposition majority to nearly tw
the number of deputies. Meantime news arrived
quest of Algiers; but the tidings were received su
opposition. Every act of the ministry was reprob
state of things could not last. The king called
council of ministers, in which it was resolved to g
tended interpretation to article 14 of the Charter,
the king the power 'of providing by ordinances for
of the state, and for the repression of any atten
the dignity of the crown.' An ably written report
up by the ministers and laid before the king, to
preamble to the forthcoming ordinances. It dwel
on the factious spirit of the newspapers, which kept
mind in a feverish state, without any plausible caus
judiced it against the king's servants, not for any
they had done, but for what it insinuated that they
On the 25th of July the king issued several ordina
tersigned by his ministers. The first ordinance
the liberty of the periodical press. No journal or
was to be allowed to appear without the royal
No pamphlet of less than twenty sheets was to be
without the permission of the secretary of state for
department, or of the local prefect. Ordinance
the newly elected House of Deputies, which h
assembled. Ordinance 3 altered the system o
reduced the number of the deputies from 430 to
placed the new elections under the direct influe
prefects. This last ordinance was decidedly an i
the constitution or Charter, for the king had no ri
the law of election. The sequel is well known.
editors of newspapers signed an energetic protest
ordinances, and continued to publish as before, a
bunal of first instance, and the tribunal of commer
ized them to do so. Then came the protest of a
deputies, denouncing the ordinances as illegal, and
ing popular insurrection as a duty. Several maste
turers turned out their men, and shut up their fact
a mass of people took up arms. Meantime Charles
quietly at St. Cloud, and merely sent Marshal
take the command of the garrison of the capital,
sisted of about 10,000 men, one-half of whom co
depended upon. On the 27th of July the first ena
place between the troops and the people. Next d
nance declared Paris to be in a state of siege, o
words, under martial law. The fighting in the stre

Many of the national guards joined the people, e tri-coloured flag, in opposition to the white ourbons. The Hôtel de Ville was taken and the 29th the people attacked the Louvre and the regiments of the line abandoned their post, with the guards evacuated Paris. On the 30th puties and peers proclaimed the Duke of Or- t-general of the kingdom, and Charles X. con- ination on the 1st of August. On the 2nd of es X. abdicated the crown in favour of the eaux, and set out for Cherbourg. The Cham- would not recognise the claims of the Duke of elected the Duke of Orleans. From Cherbourg ed for England, and finally took up his residence House. He afterwards removed to Prague in re the Emperor of Austria gave him the use of ce. In the autumn of 1836 he removed to a, for the sake of a milder climate. He there âteau' or mansion of Gräfenberg, but, soon , he fell ill of the cholera, and died on the 6th 36. He died resigned and at peace with all is body was embalmed and buried in the vaults can Convent of Goritz. His son, the Duke of ho, as well as his grandson, the Duke of Bor- ended him in his last moments, did not assume , but went by the name of Count de Marnes. Angoulême died at Goritz, in June, 1843. II., P. C.] The Duke of Bordeaux is now ining male representative of the elder branch s.

Histoire de la Restauration; Lesur, *Annuaire* 1824-30; Montbel, *Dernière Epoque de harles X.*)

XIV. of Sweden, CARL XIV. JOHAN STE JULES BERNADOTTE), born at Pau in January, 1764, was the second son of a town. He was educated in his paternal home eventeen, when one day he left it abruptly and volunteer in the regiment royal marine, in st service was in the island of Corsica, where wo years. On his return to France, he rose ugh his own good conduct to the rank of adju- doing garrison duty at Marseille in 1790, when began. Bernadotte had the good fortune to el, the Marquis d'Ambert, from the popular then excited against the nobles. Bernadotte oted into the regiment of Anjou, and as the emigrated in crowds, promotion became rapid remained under their colours. Bernadotte was olonel, and when the war broke out against ussia, he was sent to the army of the Rhine Custine, where he distinguished himself, was rigade, and afterwards became general of divi- rmy of Sambre et Meuse, under Kleber and served in the well-contested campaigns of st the Austrian Generals Clairfait, Kray, and Charles. At the beginning of 1797, he was Directory to march with 20,000 men from taly, to reinforce General Bonaparte. Berna- first interview with Bonaparte, told some friends ous to hear what he thought of the far-famed Army of Italy: 'I have seen a young man of nd twenty, who assumes the tone of a man of in my opinion bodes no good to the republic.' be mutual regard, but there was no sympathy o men. Bernadotte commanded the advanced mpaign of 1797, and distinguished himself at the Tagliamento, and in the invasion of Car- the preliminaries of peace were signed at Leo- returned to Milan and left Bernadotte in com- advanced posts in the Venetian province of adotte knew that one of the secret conditions hich was then being negotiated, was the trans- etian territories to Austria, and when the de- e wanted to make a public display of their checked their useless ardour, and advised them for the events. He received afterwards the States of Friuli for his humanity and kindness habitants of that country.

negotiations for the definitive peace, Bonaparte te to Paris to present to the Directory the from the Austrians. On his return to head- tober, 1797, Bonaparte interrogated him concerning the disposition of the various parties towards himself. Bernadotte told him frankly that he must not depend upon any party, that the Directory were suspicious of him, that he could not expect any reinforcements in case of a new campaign against Austria, and that the wisest thing that he could do was to hasten to conclude peace with the emperor. Four days afterwards, Bonaparte signed the treaty of Campo-formio.

On leaving Italy, Bonaparte took away from Bernadotte one-half of the troops which he had brought with him from the Rhine, and ordered them back to France. Bernadotte, offended at this, requested of the Directory a command in the colonies, or if not to accept his resignation. The Directory appointed him ambassador at Vienna.

In his embassy at Vienna, Bernadotte assumed a conciliatory and temperate tone, so as not to wound the susceptibility of a court and nation as yet unaccustomed to republican forwardness. He made no outward display of the tri-coloured flag and cockade. This temperance being reported to the rulers at Paris, accompanied with insinuations about the ambassador's motives, the Directory ordered him to hoist the tri-coloured flag above the entrance of his hotel. This was done on the 13th of April, 1798, and the consequence was that a mob was gathered in front, clamouring against the offensive display. The rioters forced their way into the hotel and pulled down the flag. A servant of the embassy fired a pistol and wounded one of the people. This increased the fury of the rioters, who began to destroy the furniture of the apartments, when the military interfered and prevented further mischief. Bernadotte after this left Vienna, but after some diplomatic explanations the affair was hushed up. In the following August, 1798, Bernadotte married at Paris a younger sister of Joseph Bonaparte's wife, of the name of Clary. In the following year he was appointed Minister-at-War, at a time when the French armies were discouraged by reverses, and were in a state of great destitution. He exerted himself to re-establish confidence and discipline, and to protect the French frontiers, which were threatened by the allies. He furnished Massena with the means of resuming offensive operations, which led to the defeat of the Russians at Zürich. By one of those intrigues so frequent in the councils of the French Directory, Bernadotte was recalled from the war ministry; and he was living unemployed at Paris when Bonaparte arrived from Egypt. Bonaparte tried to cajole him into an acquiescence with his views previous to the revolution of Brumaire. Bernadotte however firmly refused to join him in upsetting the constitution of the republic, and would have opposed him by force, had the Directory so ordered him. A military man, he remained strictly within the line of military duty. Bonaparte knew this; and having become first consul, he gave Bernadotte the command of the army of the West, for the purpose of pacifying La Vendée and the other disturbed districts. After Napoleon's assumption of the empire, he made Bernadotte a marshal, and sent him, in 1804, to command the army which was stationed in Hanover. He there put a stop to the irregularities and arbitrary acts which had taken place in consequence of the military occupation, and contrived to provide for the wants of his soldiers without distressing the inhabitants. This was the beginning of the good reputation which he acquired in North Germany, and which afterwards contributed materially to raise him to the throne of Sweden. In 1805 Marshal Bernadotte left Hanover with his corps to join Napoleon's army against Austria. He was present at the battle of Austerlitz, where he broke through the centre of the Russians. In June, 1806, Napoleon created Bernadotte Prince of Pontecorvo, which he designated as 'an immediate fief of the imperial crown.' In the war against Prussia Bernadotte commanded the first corps. He had some altercation with Davoust about precedence, on the eve of the battle of Jena; he afterwards defeated the Prussians at Halle, and pursued Blücher as far as Lübeck, where he defeated him. He fought afterwards against the Russians, and was wounded just before the battle of Friedland. After the peace of Tilsit, Napoleon appointed him Commander-in-Chief in North Germany, from Embden to Lübeck, with orders to take possession of the Hanseatic towns, to exclude the English trade entirely all along that line, and to induce Denmark to make common cause with France. The English expedition against Copenhagen deranged, in part, Bonaparte's calculations. In March, 1808, Napoleon ordered Bernadotte to march into Denmark, and to invade Sweden in concert with the Danes, by passing over the ice. But the Danes were slow, the thaw came, the English cruisers [illegible] in the Sound, and Bernadotte remained in Denmark. Part of the troops under him consisted of two Spanish divisions, one of which, under the Marquis la Romana, was stationed in the island of Fünen. The marquis, having learnt the invasion of Spain by the French, embarked his men on board the English fleet, and Bernadotte had just time to prevent the other division from following their example. In April, 1809, Bernadotte was ordered to join the army on the Danube, for the war against Austria. He took the command of the ninth corps, chiefly composed of Saxon troops. At the battle of Wagram, 5th of July, whilst opposed to the principal body of the Austrian army, he was deprived by Napoleon of his reserve division, which received another destination. The consequence was that he was obliged to fall back and evacuate the village of Deutsch Wagram. The following morning he expostulated in very strong words with Napoleon, on the order which had deprived him of his reserve, and exposed him to be crushed by superior forces. The battle was resumed, and, after another desperate contest and a fearful loss, was gained by the French. Bernadotte's corps alone lost six thousand men. An armistice being concluded, the marshal demanded his retirement and obtained it. Having returned to Paris, about the time when the English landed at Flushing, the minister of the interior and the minister-at-war urged Bernadotte to take the command of the troops hastily collected to oppose the enemy and protect Antwerp. He did so, but Napoleon soon after took away his command from him, and replaced him by Marshal Bessières. He was, or pretended to be, offended at some sentence of a proclamation which Bernadotte had addressed to his soldiers. The marshal was nettled, but the minister-at-war sent him back to the army at Vienna. There he had again a warm explanation with Napoleon, who reproached him with having granted an armistice to the Swedes. 'Why!' replied Bernadotte; 'the Swedes and the Poles are the only two nations in Europe that retain still some affection for your majesty.' 'What sentiment do the French feel for me, then?' asked Napoleon with bitterness. 'That of admiration, Sire, due to your astonishing success.' Napoleon seemed appeased. When he set out to return to Paris, he left Bernadotte in command at Vienna, till the ratification of the treaty of peace with Austria. At the beginning of 1810 Napoleon offered him the government-general of the Roman States. Bernadotte hesitated, but at last accepted, and began making his preparations.

Meantime important events had taken place in the North, in which Bernadotte was to act an unexpected part. Gustavus IV., King of Sweden, had been obliged to abdicate the crown in March, 1809, on account of his incapacity; and the States of Sweden had declared him and his descendants excluded for ever from the throne. His uncle, the Duke of Sudermania, assumed the government under the title of Charles XIII. Being childless, the States chose for prince royal and heir to the throne, Augustus of Holstein Augustenburg, brother of the reigning Prince of Augustenburg. But in less than a year Prince Augustus died suddenly, whilst reviewing some troops at Helsinborg, 26th of May, 1810. It was necessary to choose another heir to the crown of Sweden. Several candidates presented themselves; the brother of the deceased prince, and the King of Denmark, among others; but none of them seemed to suit the circumstances of Sweden. Sweden required a man of firmness, a good administrator, and of tried military abilities. Bernadotte had displayed all these qualities during his command in North Germany in 1808 and 1809. The people of Hamburg and the other Hanseatic towns spoke highly of his justice and moderation. He had behaved with kind regard towards the Swedish prisoners of war, and had readily granted an armistice on the first application of the Duke of Sudermania, afterwards Charles XIII., who on the present occasion cast his eyes upon him, and proposed to the Swedish Diet assembled at Oérebro in August, 1810, Marshal Bernadotte, Prince of Pontecorvo, as Prince Royal of Sweden. 'His majesty,' said the message, 'having consulted the Secret Committee, as well as the Council of State, on this important question, has met with a great majority in the first and a unanimity in the second of these bodies in favour of his proposal. The Prince of Pontecorvo being once entrusted with the future destinies of Sweden, his established military reputation, whilst ensuring the independence of the kingdom, will make him avoid useless wars for the mere sake of renown; his mature experience and energy of character will maintain order in the interior; and
love of justice and humanity which he has exhibited in
countries are a guarantee of his conduct towards the
country which should adopt him; and lastly, the ex
his son will put an end to any further uncertainty o
the succession to the crown.' Two Swedish officers
sent to Paris to sound Bernadotte on the subject of
tion. Bernadotte asked the Emperor Napoleon, who
that if he were elected by the free choice of the S
(the emperor) would consent to his accepting the c
cannot assist you however in this,' added Napoleon,
things take their own course.' It being rumoured
that the French minister at Stockholm supported t
of the King of Denmark, Bernadotte frankly told
of this, who seemed to disbelieve it, and soon afte
his minister. The Emperor Alexander, on his par
oppose Bernadotte's election, but rather approved o
the 21st of August, 1810, the Diet voted unanimousl
the midst of acclamations, Jean Baptiste Jules B
Prince of Pontecorvo, to be Prince Royal of Sweden
to the throne, on condition of his adopting the com
Augsburg. Charles XIII., at the same time, formall
him as his son. A Swedish envoy carried these doc
Paris, with letters from the king to the new-elect
and to the Emperor Napoleon, who both answer
affirmative. Bernadotte however could not leav
without having received letters of emancipation, reli
from his allegiance to the emperor. After waiting
Bernadotte complained to Napoleon of the delay,
latter told him, that by a decision of his Secret Co
letters of emancipation should only be delivered to
he had signed an engagement never to wage w
France. Bernadotte said to him, with some warmt
condition was impossible; that by the very act of h
he was precluded from entering into any engageme
a power foreign to Sweden, and that nothing remain
but to renounce the proffered dignity. Napoleon r
moment, then said, hurriedly, 'Well, go! let our c
accomplished.' He then reverted to the continen
and said that Sweden must conform itself to it.
observed, that he must have time to examine thi
spot, to make out the feelings of the Swedes, and
self acquainted with their interests. 'How long
quire?' cried out Napoleon. 'Till next May
prince. This was at the beginning of October.
you this delay,' replied Napoleon; 'but then decla
either friend or enemy.' Bernadotte hastened to le
but did not think himself safe until he had crossed
The day of his departure from Paris, Napoleon
that he wished that Bernadotte had refused; but t
dotte did not like him; that they had never unde
another: and that it was now too late.

The Prince Royal was met at Elsinor by severa
high dignitaries, and the Archbishop of Upsal
rest. He told that prelate that he had been in
instructed in the reformed religion, which was pr
many in his native Béarn, that he had since co
Germany with protestant clergymen on religiou
and that he now declared that he believed in the do
tained in the Confession of Augsburg, such as i
sented by the Princes and States of Germany to th
Charles V. On the 20th of October he landed at I
and he entered Stockholm on the 2nd of Novem
the salutes of the artillery. On the 5th he att
Assembly of the States, in which Charles XIII. pre
addressed the King and the States in succession
his intention to live entirely for the good of hi
country. 'Brought up in the camp,' he thus con
have been familiar with war, and am acquainted w
calamities; no conquest can console a country for
of its children shed in a foreign land. Peace i
glorious object of a wise and enlightened governm
not the extent of a country, but its laws, its com
industry, and above all its national spirit, that co
strength. Sweden has of late experienced great
the honour of the Swedish name remains unscath
have still a land sufficient for our wants and iron
ourselves.' Two days after, dispatches came from
demanding in the most imperious tone that Sweden
clare immediately war against England. The
setting in, precluding all hopes of assistance fro
in case of an attack by the French troops through
In this emergency the King declared war against
but his situation was well understood by the Britis
and the result was a state of non-intercourse rather
tilities. But Napoleon did not stop here; he d

tution, and elected Christian for their king, who soon after dissolved the assembly. The King of Denmark sent commissaries to summon Christian to fulfil the treaty of Kiel, but little attention was paid to this formality. Four commissioners, of England, Russia, Prussia, and Austria, came to remonstrate in favour of the same treaty, but they obtained only evasive answers. A Swedish army and fleet were then put in motion against Christian. King Charles XIII. and the Prince Royal commanded in person. After some trifling actions on the frontier, the Swedes entered Norway; an armistice was concluded, and the Storthing, or general assembly of Norway, being convoked, required Christian to renounce the authority with which he had been intrusted by the nation. Christian abdicated and returned to Copenhagen. The Storthing then entered into communication with the Swedish commissioners, and after some deliberation, elected unanimously Charles XIII. of Sweden to be king of the kingdom of Norway, and Carl Johan as prince royal. The king and prince on their part swore to the constitution of Norway as voted by the Storthing. Norway remained much more free than when a mere dependency of Denmark, as it had been for three centuries. The Prince Royal entered Christiania in the midst of acclamations, and received the oath of allegiance of the deputies to Charles XIII. in November, 1814. The Scandinavian peninsula was now united under one sceptre, and 'no more Dovre' was the common word of union, meaning that the natural boundary of the Dovrefeld, or mountains between the two countries, was no longer a political barrier.

In July, 1817, Prince Oscar, son of the Prince Royal, attained his majority, which was celebrated by a public and affecting solemnity. This young prince, who had followed his father to Sweden in 1810, had been educated as a Swede in every respect. At the end of that year Charles XIII. fell ill, and on the 5th of the following February, 1818, he expired, happy in the choice of his adopted son. Carl XIV., Johan, was immediately proclaimed, both in Sweden and in Norway, and was in due time acknowledged by all the princes of Europe. Even the deposed Gustavus wrote him a letter of congratulation from Switzerland. The new king was crowned at Stockholm, in May, by the archbishop of Upsal, and afterwards at Drontheim in September, by the Bishop of Aggerhus, with unusual splendour.

The twenty-six years of the reign of Charles XIV. have been for Sweden and Norway a period of peace and internal improvement. Every branch of the administration, the finances, the navy, the army, the roads and canals, public instruction, all have been improved. The great canal of Gothia, which joins the Baltic to the Northern Sea, was opened in 1832. Agriculture has made great progress. Sweden, which was obliged to import large supplies of corn, now produces enough for itself, and even exports corn. The breed of horses has been greatly improved; the public debt has been reduced almost to nothing; the taxes are collected with little or no expense. Sweden has more than 2500 merchant ships, exclusive of coasting vessels, which is double what she had in 1810. For other details we must refer to the works quoted at the end of this article. It may be easily supposed that the military service in all its branches received the especial attention of Charles John. In his speech on the opening of the Swedish Diet, in January, 1840, he recapitulated with honest satisfaction all that had been done for the country under his reign.

The attachment between Alexander of Russia and Charles John lasted till the death of Alexander, whose successor Nicholas, the present emperor, wrote to the King of Sweden, 'I look upon the continuation of your friendly sentiments as one of the most valuable legacies left me by my brother.'

Charles John had completed his eightieth year when he was seized by an illness, in January, 1844, which brought him to the grave on the 8th of March following. His son, Oscar I., succeeded him. Upon the whole, the life of Charles John Bernadotte is one of the most instructive biographies of our own times; it affords subject for serious reflection, and is a useful comment on the history of Napoleon.

(Touchard-Lafosse, *Histoire de Charles XIV. Jean, Roi de Suède et de Norvège*; F. Schmidt, *La Suède sous Charles XIV. Jean*; Daumont, *Voyage en Suède*; Laing's *Tour in Sweden*; Count Biörnstjerna, *On the Moral State and Political Union of Sweden and Norway, in answer to Mr. Laing's Statements.*)

CHARNOCK, STEPHEN, a nonconformist, was known in his lifetime as an active and eloquent theologian, and is now remembered for the merit of writings not published till after his death. He was born in London, in 1628. At
he was senior proctor in the University of Oxford;
wards he became a preacher in Dublin. Being eject
by the Act of Uniformity, he held for fifteen years t
of a dissenting congregation in London, where h
1680. His printed works are the following:—'Se
courses of the Existence and Attributes of God,' 1
'Works,' 1684, 2 vols. fol.; 'Two Discourses,' 16

CHARITABLE USES. [USES, CHARITABLE A
STITIOUS, P. C.]

CHARITIES. [TRUST AND TRUSTEE, P. C., p

CHARTER. This word is from the Latin *chart*
of uncertain origin: the Greek form of the word i
(χάρτης). Charta appears to have signified writing
made of papyrus. The term was afterwards applied
to the materials for writing, but to the writing itsel
letter or the leaf of a book. In English law it was
denote any public instrument, deed, or writing, bein
evidence of things done between man and man, and
as a perpetual record. (Bracton, lib. 2, c. 26.) A
Saxons such instruments were known as *gewrite*, or

Charters are divided into—1, Charters of the c
Charters of private persons.

1. Royal charters were used at a very early p
grants of privileges, exemptions, lands, honours, pa
other benefits that the crown had to confer; and
term became restricted to such instruments as confe
right or franchise. These instruments did not diff
from letters patent, being usually addressed by the k
his subjects, and exposed to open view, with the
pendent at the bottom; but such as contained grant
cular kinds were distinguished by the name of chart
as giving was the object of a charter, the term be
popular, and was used in a more extended sense,
laws of a popular character.

Whatever may have been the prerogatives and
authority of the kings of England, it is certain tha
earliest times there were many rights and liberties
the law of the land belonged to the people. As t
often restrained and violated, nothing was more acc
the nation than a formal recognition of them by th
and the popular name of charter was applied to th
laws by which the kings from time to time confirm
larged the liberties of the people. Such laws were
not only as concessions from the king, but as contrac
man and man—between the king and his subjects;
the same time, they were promulgated as the legis
of the sovereign authority in the state.

The charter of William the Conqueror, for obs
laws throughout England, was in the nature of a
It settled the religion of the state, and provided for
and government, for the administration of justice, th
ment of criminals, and the regulation of markets; it
the titles to lands, and the exemption of the tenant
of the crown from all unjust exaction and from talla
words are those of a lawgiver appointing and com
'*statuimus*,' '*volumus et firmiter precipimus*,' '*inte*
'*decretum est*,' are the expressions by which m
ordered or prohibited. (*Fœdera Rec. Comm. Ed.*, v

The charters of liberties granted by Henry I.,
Henry II., John, Henry III., and Edward I., are
or less, in the nature of public laws, either making
visions, or confirming, enlarging, and explaining
laws, and relate to the freedom and good governme
people, and all the most important interests of th
Some of them are still regarded as authoritative d
of the rights and privileges which the people of Eng
enjoyed for centuries.* So valid and binding were
charters considered, that in the 37 Henry III. (A
in the presence of the king, several of the fir
'and other estates of the realm of England,' the
and bishops, excommunicated and accursed all w
violate or change 'the church's liberties or the
proved customs of the realm, and chiefly the lib
tained in the charters of the common liberties a
forest, granted by our lord the king.' In those
sanction more solemn could have been given to the
of any law. It was intended chiefly as a check upo

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* They are printed at length in the first volume of the 'S
Realm,' published by the Record Commissioners. With the ex
charter in the 25th Edward I., they are all in the Latin lang
Tower of London there are charter rolls of all royal charters
1483; and in the Rolls Chapel from 1483 to 1516. A part
has been published by the Record Commissioners.

power had been restrained by the popular con-
in the charters of liberties, but it was also
t all his subjects who should violate the liber-
ple. [Magna Charta, P. C.]

er-laws, though often expressed to have been
dvice of the king's council, implied an absolute
er vested in the crown; and as royal preroga-
strained and the public liberties enlarged, legis-
er was gradually superseded by the statutes and
de in parliament. During the reigns of Henry
ard I. laws were promulgated in both forms;
time statutes and ordinances have been the
f legislation—not differing materially, at first,
or in the nature of the authority from which
, from the charters of earlier reigns, but gra-
g their present character as acts agreed to by
slature.

standing the discontinuance of the practice of
general laws by royal charter to bind the whole
xercise of prerogative, by means of charters, has
gislative character throughout the entire history
government. Some of the most antient and im-
e were charters to boroughs and municipal bodies,
unities and franchises, of which the greatest was
representatives to parliament. There are still
al charters of the Saxon kings, and of the Nor-
r the Conquest, conferring various rights upon
of boroughs, of which an exclusive jurisdiction
; but the first charter of incorporation to any
appears to have been granted in 1439, in the
VI., to Kingston-upon-Hull; although, in the
or charters, it has been usual to presume that
ning existing usages had been lost.

the king's charters have conferred upon
right of sending members to parliament, it
eral cases, by the House of Commons, that the
by the common law could not be varied by
the crown. (Glanville's *Reports*, p. 47, 63,
the reigns of Henry VIII. and Charles II.
0 members were added to the House of Com-
charter, the last borough upon which that right
in this manner, having been Newark, in 1673.
e were antient boroughs which had ceased to
and whose rights were thus restored by charter;
ns, expressly created boroughs by charter, did
ers to parliament for centuries afterwards, as
for example, to which a charter was granted
which did not return members until 1578.
een argued that, notwithstanding the practice
, the charter of the crown alone was not suffi-
entitle a *town* to send members to parliament,
ssly created a borough, to which, by the com-
ight of sending members was incident. (Mere-
ephen's *History of Boroughs and Municipal*
Introduction, and pp. 664, 1256, 1774, &c.)
ives confirmation from the acknowledged law
was unable, by charter, to exempt a borough
members, since that right was always held to
r the benefit of the whole realm, and not for
of the particular place. (Coke, 4th Inst. 49.)
ounds a charter of exemption to the citizens of
red void by act of parliament, 29 Henry VI. c.
liamentary representation has, at length, been
y arranged for the whole kingdom by the
the legal effect of royal charters upon the
se has become a question merely of historical
peculiar rights of corporations have also been
the Municipal Corporations Act; but a power
ed to the crown, with the advice of the Privy
ant charters of incorporation to other towns,
ion of the inhabitants, and to extend to them
of the Municipal Corporations Act (5 & 6
6, § 141.)

re formerly granted by the crown, which esta-
olies in the buying, selling, making, working,
things; an injurious practice, contrary to the
ndamental laws of the realm, which was abo-
1 James I. c. 3. [Monopoly, P. C.]

has ever exercised, and still retains, the prero-
porating universities, colleges, companies, and
dies, and of granting them, by charter, powers
not inconsistent with the law of the land. But
onsiderable bodies ordinarily require powers which no authority but that of parliament is able to confer, such corporations as the East India Company and the Bank of England, which were originally established by royal charter, have long since derived their extraordinary privileges from acts of parliament, as well as other public companies which have been incorporated in the first instance by statute.

But the largest powers now conferred by royal charter are those connected with the colonies and foreign possessions of the crown. Whenever a new country is obtained by conquest or treaty, the crown possesses an exclusive prerogative power over it, and by royal charters may establish its laws and the form of its government; may erect courts of justice, of civil and criminal jurisdiction, and otherwise provide for its municipal order, for the raising its revenue, and the regulation of its commerce. (Chitty *On Prerogatives*, c. iii.) This power of the crown however is always subject to the ultimate control of parliament; and even if deputed to a legislative assembly, or other local government, possessing rights and liberties defined by charter, the crown cannot recall the charter, and govern by any laws inconsistent with its provisions, or at variance with the common law.

2. Charters of private persons are the title-deeds of lands, many of which are the antient grants of feudal lords to their tenants. These pass with the land as incident thereto, and belong to him who has the inheritance; or, if the land be conveyed to another and his heirs, the charters belong to the feoffee. A charter of the crown, granted at the suit of the grantee, is construed most beneficially for the crown, and against the party; but a private charter is construed most strongly against the grantor.

(Introduction to *Rotuli Chartarum*, 1837; Fleta, lib. iii. c. 14; Comyn's *Digest*, tit. Charters; Coke, 1*st Inst.* 6 *a*, 7 *a*; 2*nd Inst.* 77; Cowel, *Law Dictionary*; Blackstone and Stephen's *Commentaries*; Preface to *Statutes of the Realm*, &c.)

CHARTER-PARTY. [Ships, P. C.]

CHARTISTS, the name given to a political party in this country, who propose extensive alterations in the representative system, as the most direct means of attaining social improvement, and whose views are developed in a document called the 'People's Charter.' The principal points of this proposed charter are, universal suffrage, vote by ballot, annual parliaments, the division of the country into equal electoral districts, the abolition of property qualification in members and paying them for their services. The principles of the charter and the means of carrying them into effect have also been embodied in the form of a bill. It was prepared in 1838 by six members of the House of Commons and six members of the London Working Men's Association; and the following are the most important of its enactments:—I. The preparers of the Bill allege the low state of public feeling as an apology for not admitting women to the franchise, and it is therefore only provided that every male inhabitant be entitled to vote for the election of a member of the Commons' House of Parliament, subject however to the following conditions:—1. That he be a native of these realms, or a foreigner who has lived in this country upwards of two years, and been naturalized. 2. That he be twenty-one years of age. 3. That he be not proved insane when the lists of voters are revised. 4. That he be not convicted of felony within six months from and after the passing of this act. 5. That his electoral rights be not suspended for bribery at elections, or for personation, or for forgery of election certificates, according to the penalties of this act. II. That the United Kingdom be divided into 300 electoral districts, so as to give uniform constituencies of about 20,000 voters each. III. That the votes be taken by ballot. IV. That a new parliament be elected annually; that the elections take place on the same day in all the districts: and that electors vote only for the representative of the district in which they are registered. V. That no other qualification be required for members than the choice of the electors. VI. That every member be paid 500*l.* a year out of the public treasury for his legislative services; and that a register be kept of the daily attendance of each member.

There is nothing new in the principles or details of the People's Charter. They have, either separately, or some one or other of them in conjunction, been a prominent subject of discussion at various intervals within the last seventy years. In 1780 the Duke of Richmond introduced a bill into the House of Lords for annual parliaments and universal suffrage. In the same year the electors of Westminster appointed a committee to take into consideration the election of members of the House of Commons, and in their report they recommended the identical points which now constitute the main features of what is called the People's Charter. The Society of the Friends of the People, established in 1792, three years afterwards published a declaration which recommended a very large extension of the suffrage. In seasons of national distress, the amendment of the representative system has always been warmly taken up by the people of this country.

In 1831 the wishes of a large mass of the middle classes were realized by the passing of the Reform Act. A season of political repose, and, as it happened also, of commercial prosperity, followed the excitement which preceded the passing of that measure. A victory had been gained, and the people waited for the benefits which they were to derive from it. In the next period of distress which arose, the amended state of the representative system and the advantages which it had brought were narrowly scanned; and the consequence was, the gradual formation of a party who were dissatisfied with its arrangements, and sought to attain the ends of political and social good by a more extensive change. This is briefly the origin of Chartism and of the People's Charter. The middle classes were, however, well satisfied on the whole with the overthrow of the rotten boroughs and the enfranchisement of the large towns, and therefore the Chartists stood alone, and began to regard them with a feeling of hostility. Chartists were sometimes found, as in all other parties, ready to assist the party which differed most widely from them, with the object of thwarting the political objects which the middle classes had at heart. In 1838 they had become a large party and embraced a great number of the working classes employed otherwise than in agriculture. The number of signatures attached to the petition presented at the commencement of the session of 1839 in favour of the People's Charter was upwards of one million and a quarter. Unfortunately the idea began to be entertained amongst a certain class of the Chartists that physical force might be justifiably resorted to if necessary for obtaining political changes; and the party became divided into the Physical Force Chartists and the Moral Force Chartists. The former became implicated in disturbances which took place at various times in several parts of the country; and many persons of this class never having had correct views respecting the wages of labour, it appeared as if they had adopted the cry of 'a fair day's wages for a fair day's work' as an additional point of the People's Charter. The disturbances in 1842 in the midland and northern counties were to some extent encouraged by the less intelligent of the Physical Force Chartists. At the close of 1841 however an attempt was made to combine the middle classes with the Chartists in their attempt to obtain an extension of the suffrage. Early in 1842 a Complete Suffrage Union was formed at Birmingham; and in April of the same year a conference, consisting of eighty-seven delegates, was assembled at Birmingham, which sat for four days; three of which were spent in agreeing upon a basis of union between the middle and working classes, and the last day in adopting plans of practical organization. The six points of the People's Charter were adopted by the conference, and the details were left for settlement to a future conference. It was resolved also at this conference to establish a National Complete Suffrage Union. The proposed National Conference commenced its meetings in December, 1842, and was attended by 374 delegates. Here a rupture took place between the Chartists and the Complete Suffrage party, and the latter were outvoted on the question of adopting the People's Charter instead of the Complete Suffrage Bill. The minority however proceeded to act upon their views as developed in the Complete Suffrage Bill. This bill does not contain any disqualifying clauses. In other respects it differs from the People's Charter only in matters of detail. These are the only two plans connected with the extension of the franchise which are at present supported by any large class in this country. The Chartists and the Complete Suffragists are only nominally distinct parties; but the former may be characterised as possessing a greater hold on the working classes than the Complete Suffragists, whose ranks are chiefly recruited from the middle classes: their objects however are so similar, that they may at any time unite without any sacrifice of principle.

CHASING OF METALS. The process termed chasing, or enchasing, as applied to working in metals, so far resembles a kind of stamping as to admit of the two processes being described here together.

Metallic goods are generally made in one of three ways—by casting in moulds, by forging or turning in masses, or by *pressing or stamping* out of thin sheets. The last of these
three has been greatly developed at Birmingham
last few years. Either the entire article receive
from the sheet by stamping, or, when roughly
receives an ornamental device by a sort of fine
For the latter variety of work, steel blocks,
bosses, are provided, each one presenting at the end
form, such as curved, angular, square, &c.; and
fixed or held with the finished end uppermost.
to be ornamented, which is always of a thin hollo
placed face uppermost on the punch; a pattern or
drawn on the face of the article, and the adjustm
made that the punch beneath shall follow the co
lines in the device. A fine hammer is then employe
the piece of thin metal; the effect of which is, that
is forced upwards in a fine burr or protuberance at e
where there is a punch beneath it. By shifting th
metal so that different parts of its lower surface may in
be brought over the punch, and by changing the fo
punch when necessary, a protuberant design or
relief is formed on the article of metal.

But a more extensive kind of manufacture is that
the article receives its form by being stamped or pre
a plain piece of sheet metal. The hammer, the
roller, the stamp, and the lathe, are all employed
this, according to the thickness of the metal and th
the article to be made from it. When vessels and holl
are fashioned out of thin sheet-metal by the hamm
stitutes *brazing:* the metal is rested upon bosses or
ports of different kinds, and hammered on the upp
till it assumes the requisite curvatures. The swage
liar kind of gauge or pattern which gives the req
to the sheet metal by pressure rather than by percu
us suppose (as a familiar mode of illustrating its act
pair of scissors has the two blades so curved that the
of the one may fit into or correspond with the c
the other; if these blades were nearly closed, and a
of metal were drawn between them, it would be
a curved form similar to that presented by the bla
arrangement of the different parts of the swage is
as to lead to some such result as that here indic
beadings and hollows on the edges of dish-covers
articles are produced by means of swages.

Many articles, such as large plain hollow
brought into form mainly by rollers. Tinsmiths of
three rollers to bring their tin to the proper form
and cylindrical vessels. There are two rollers pl
in contact, and in the same horizontal level wi
above them, equidistant from both; all are cap
volving, and if a piece of tinned iron be draw
them, it will be forced to conform to the size
of the cavity existing between the upper and the
rollers: by varying the sizes and mutual distan
rollers, different curvatures of the tin may be prod

The lathe is employed in rather a singular way,
duction of various kinds of articles from thin
principally from soft white yielding alloys of tin
metals. A flat circular disc of metal can by this
brought to the shape of a box, a cup, a hemisph
one among numerous fanciful forms. The disc is
a lathe provided with a boss or block of the requ
and a blunt tool is pressed against it while revolvin
and ductile metal yields to the pressure and conf
shape of the boss against which it is placed. B
little the workman effects the transformation of th
of metal to a shape which it could not assume unl
soft and ductile.

The most important however of these modes
sheet-metal is by stamping. In this process the th
suddenly and very forcibly compressed between tw
or stamps, each of which is engraved with a pattern
One die is fixed on a stand with its face uppermost
other is fixed face downwards to the lower end
hammer or weight. The thin piece of metal is pla
lower die; the hammer with the upper die is raise
and pulley to a considerable height; and on this bei
suddenly to fall, the upper die forcibly compress
piece of metal which lies between it and the lower,
it to assume alternate convexities and concavities a
the pattern. Each die is an exact counterpart or
the other, like the two halves of a swage, so that
cannot conform to the convexity of the one with
into the concavity of the other; and it is by t
action that the result is produced. Spoons, forks, a

umberless variety are produced by stamping between two modified in various ways according to the particular object iew.

his mode of stamping requires as many dies as there are rent patterns. Dr. Ure, in illustration of the heavy k which the manufacturers at Birmingham are thus forced eep by them, and of a difference in this respect between n and the French manufacturers, remarks: 'M. Parquin, greatest manufacturer of plated goods in Paris (or France, this business is monopolized by the capital), who makes to value of 700,000 francs per annum, out of the 1,500,000 ch he says is the whole internal consumption of the king-, states that the internal consumption of the United gdom amounts to 30,000,000, or twenty times that of nce. He adds that our common laminated copper costs ous the pound, while theirs costs 34. Their plated goods fashioned not in general with stamps, but by the pressure ools upon wood moulds in the turning-lathe, which is a at economy of capital to the manufacturer. There are ories at Birmingham which possess a heavy stock of ,000 different die-moulds.' This 'pressure of tools upon d moulds in the turning-lathe' corresponds with one of esses above described.

or different applications of the above processes to manu-ares, see Button, P. C., and Coining, P. C. For the e of making the dies, Die-Sinking, P. C. S.; and for ping in connection with electro-gilding and silvering, tro-Metallurgy, P. C. S.

HATHAM ISLANDS are a group of islands situated he Pacific, east of New Zealand, between 43° 40′ and 20′ S. lat., and 176° and 177° 20′ W. long. They con-of one large island, two of moderate extent, and several er islands. The largest is called Warekauri, and is in orm of a hammer with a short handle. The northern which represents the iron portion of the hammer, is forty-eight miles long from east to west: that which ds from it southward does not much exceed thirty-six in length. Dieffenbach, by a rough computation, gives rea at 477 nautical miles, or 305,280 acres, of which ver 57,600 acres at least are water, being lakes, lagoons, so that the land is not more than 247,680 acres.

e southern shores of the southern peninsula of the island ned with rocky cliffs, but the remainder terminates in a andy beach, with the exception of a few headlands along orthern coast, which are formed by low rocky masses. country rises gradually from the beach for one or two , when it extends on an undulating level. The central f the island is occupied by a large lake, called Te Wanga, h is about twenty-five miles long, and between six and broad. It is surrounded by hills, either wooded or boggy. ts eastern side it is separated from the sea by low sand-about a hundred yards broad, and at one place the inter-g hills disappear, and between the lake and the sea there y a low sandy beach, which in 1842 was washed away by ea, so that since that time the lake has become a portion of cean, if the opening has not again been filled up. Before event the water of the lake was slightly brackish, which scribed to infiltration of sea-water; otherwise it must been fresh, as two large streams empty themselves into outhern part of the lake.

e surface of the tract which lies west of the northern of the Te Wanga lake is diversified by a considerable er of hills of a pyramidal shape, and consisting of basalt. of these hills are more than 800 feet in height. In vicinity the soil is very fertile, being in its natural state red with a vegetation of fern and trees, mixed together, and aring like oases in the surrounding bog. The intervening s are covered with bog, which however does not appear e deep, and it is supposed that if they were drained they d be productive, and fit for grain or pasturage. Wherever superfluous water has been carried off by a natural outlet, h vegetation of fern and New Zealand flax (*Phormium* r) has sprung up, which gives additional firmness to the by the decayed leaves, and yields a rich harvest to the e planter. This is particularly the case on the low hills e the sea-shore, which are well watered, and extend over each like a verdant zone. Where these hills are sandy, the yed leaves from the trees have formed a light black soil, h the natives prefer for agriculture. In this part several occur at the back of the low hills which run parallel to oast. They are surrounded by gently sloping hills, but generally an outlet for their waters into the sea. In the ior of the northern tract, east of the lake of Te Wanga, there is an extensive tract of dry soil of considerable fertility, which is well wooded, but near the sea it is covered with sand, and this is also the case with the narrow band of land that separates the lake from the sea. The best portion of the island is that south of the lake, which has an undulating surface, is not so boggy as the rest, and is either covered with an open forest of moderate sized trees, or with high fern, in which case the land can be brought under cultivation with little labour. The soil is very fertile, and the vegetation is vigorous. The winds which sweep over these islands are not violent enough to injure vegetation, and it is only in a few exposed places that stunted shrubs appear.

On the western side of the island is a large bay, called Waitanga Bay, where there are five harbours behind some projecting headlands. On the southern shores of the bay is Waitanga harbour, which has excellent anchorage in between five and twelve fathoms. Though open to the north-west, the swell of the sea is broken by the projecting peninsula, which lies north of the bay and by a reef. This harbour receives the largest river in the island, the Mangatu, which comes from some hills on the south; though its whole course does not exceed twelve miles, it is navigable for boats for about three miles from its mouth, even at low-water, as the depth is often twelve feet, though the channel is narrow: but it has a bar across its mouth, which is passable for boats only at high-water. On the northern side of Waitanga Bay are four harbours, not far from one another, called, from east to west, Wangatchi, Wangamoe, Wangaroa, and Pohanta. The third named is frequently visited by vessels, and affords complete protection against all winds. The three others are not much known, but reported to be good. The northern shore of the island is much exposed, but contains a sheltered bay six miles from the north-eastern extremity of the island, called Kaingaroa, which is stated to have good anchorage in from ten to twelve fathoms water. There are no harbours on the eastern and southern coast except at Oinga, the south-eastern headland of the island, where the hills offer some protection against wind and sea: this place is frequently visited by whalers.

The climate is very mild. In winter (from May to July) the thermometer never rises above 60°, nor descends below 45°, after eight o'clock in the morning. The air is always moist and cool, but never misty, the vapour being carried off by the constant breezes. Even during the winter the sky is generally cloudless, and of the deepest blue; but there is no want of rain. In winter at least there are showers for a few hours every week. The prevailing winds are north-east and south-west. The climate appears very favourable to Europeans.

The natives cultivate potatoes, different kinds of turnips, cabbages, taro (*Arum esculentum*), some tobacco, and abundance of pumpkins, which form a great part of their food. There are several kinds of trees, which are of the species found in New Zealand: the karaka-tree (*Corynocarpus laevigatus*) forms the largest part of the forest. No kind of quadruped occurs, except the Norwegian rat. Birds are numerous: in the lakes and on the sea-shores are ducks, snipes, plovers, curlews, and redbills; in the forests the mocking-bird, a little green parroquet, the mako-mako, a singing-bird, and the large New Zealand pigeon. Fish is very abundant. Both the spermaceti and black whales are seen in great numbers off the shore, and visit the east coast, especially in June and the following months.

These islands were discovered in 1791 by Broughton, of his Majesty's ship Chatham, who took possession of them in the name of the king. They were afterwards frequently visited by whalers, and in 1840 a whaling-station was established at Oinga. Broughton found them inhabited by a people belonging to the Malay race. They are not so tall, muscular, and well proportioned as the New Zealanders. They have often short necks, thick heads, and, when young, prominent paunches; the forehead is often low and sloping, the cheekbones prominent, the eyes narrow, and the nose flat and clumsy. All have black glossy hair, which is sometimes curly. Their complexion is darker than that of the New Zealanders. Broughton estimated the population at 1200 individuals; but Dieffenbach thinks that in 1840 not more than ninety of the aboriginal inhabitants were found there. The reduction of their number is to be ascribed to the state of slavery and degradation to which they have been subjected by two tribes of the New Zealanders. As the Chatham Islands are only about 450 marine miles distant from Port Nicholson in Cook's Strait, two New Zealand chiefs visited the Chatham

Islands in whaling vessels. They soon saw that it would not be difficult to take possession of the islands, and to reduce the inhabitants to slavery. As their tribes had been driven from their original possessions by their more warlike or more powerful neighbours, they induced them to go to the Chatham Islands, and effected their emigration by hiring a British brig for that purpose, which carried them over in two trips. The aborigines were reduced to slavery without opposition, and divided among the New Zealand tribes, as well as the land. The number of the New Zealanders who thus settled in the Chatham Islands is stated to have been eight hundred: and, by means of the labour of their slaves, a portion of Warekauri was soon brought into cultivation, so that they could furnish supplies for the three or more vessels which annually resort to the island. The aborigines possessed neither dogs nor pigs; the New Zealanders introduced dogs, together with potatoes and different kinds of seeds. A part of Warekauri has been purchased from the chiefs by British citizens, and the island is considered an appendage of the colony of New Zealand.

South-east of Warekauri lies Rangi-haute, or Pitt's Island, which is about twelve miles long and eight broad. It consists principally of a hill of moderate elevation, having a flat top, whose declivities terminate near the coast. It has no harbour, and is stated to be inhabited by a small number of aboriginal natives. The other islands are mere rocks, and only frequented by sea-birds.

(Dieffenbach's 'Account of the Chatham Islands,' in *London Geographical Journal*, vol. xi.)

CHAUDET, ANTOINE DENIS, a celebrated French sculptor, born at Paris, in 1763. He was the pupil of Stouf, and in 1784 he obtained the grand prize of the Academy for sculpture, by a bas-relief of Joseph sold by his Brethren. He studied some time in Rome, and returned to Paris in 1789, when he was elected an Agréé of the Academy of Painting and Sculpture, of which he became later a member and professor of sculpture. He was made a member of the Institute in 1805, and took part in the preparation of the Dictionary of the French Academy; he edited the 'Dictionnaire de la Langue des Beaux Arts.' He died in 1810.

There are several excellent works by Chaudet in public buildings of Paris, but one of his chief performances, the colossal bronze statue of Napoleon in the heroic or Roman costume, which stood on the column of the Place Vendôme, was melted down in 1814 by the government of Louis XVIII., and the metal was used to form part of the horse of Henry IV. on the Pont Neuf. The present statue in Napoleon's own costume, by Seurre, was fixed on the column in May, 1833, in place of the fleur-de-lis and flag-staff, which were originally substituted for the statue by Chaudet. Chaudet was likewise a painter of considerable merit; and his widow also, Madame Chaudet, distinguished herself as a *genre* and portrait painter.

(Gabet, *Dictionnaire des Artistes*, &c.)

CHEADLE. [STAFFORDSHIRE, P. C.]

CHEIRACA'NTHUS, a genus of fossil fishes from the old red sandstone of Gamrie in Forfarshire and the Orkneys. (Agassiz.)

CHEIRANTHUS. [WALL-FLOWERS, P. C.]

CHEIRO'LEPIS, a genus of fossil fishes from the old red sandstone of the Orkney Islands and Morayshire. The scales are very minute. (Agassiz.)

CHEIROTHE'RIUM. The foot-prints on the red sandstone of Hildburghausen were referred by Kaup to a mammiferous animal under the above title. To the same origin many similar remains in England have been referred. Professor Owen is of opinion that the animal was reptilian, and that it may be regarded as identical with the Labyrinthodon, of the same formations, of which the teeth are very characteristic. The animal was probably a Batrachian Reptile. The foot-prints occur with ripple marks, and what are called rain marks, on the flaggy red standstones of the Mersey.

CHE'LIFER, a genus of *Arachnidæ* remarkable for the resemblance which the species composing it bear to scorpions. Hence Lamarck styled the order in which he placed them 'les faux scorpions,' associating them with *Galeodes*. The mandibles of *Chelifer* are short, with didactylous extremities. The palpi are two, very long, and fine-pointed, resembling arms, and having claws at their extremities. The maxillæ are connivent, and two in number. The eyes are two in the *Chelifers* proper, as distinguished by Hermann from the species of the genus *Obisium* of Leach, which have four; they are placed at the sides of the thorax. The body is ovate, anteriorly acute, and depressed. The feet are eight.

These curious animals are very small and resemble miniature scorpions deprived of their tails. They run fast, moving backwards, forwards, and often sideways like crabs. They live under stones, in crevices of rocks by the sea-side, under bark of trees, and in houses among old papers and old fur-niture. They feed upon insects. They are found in all parts of Europe.

CHE'LODUS, a genus of fossil Mammalia proposed by Kaup. It is of the rodent type, allied to the beaver and por-cupine, and occurs in tertiary beds at Eppelsheim, near May-ence.

CHEMISTRY. It can hardly have escaped the notice of even the most casual observer of the progress of science in general, that the advance of chemical knowledge within the last few years has been much greater than has ever previously been made in an equal time.

This observation applies with peculiar force to the disco-veries which have been effected in the chemistry of organic bodies, whether neutral, acid, or alkaline in their nature: and therefore, in addition to the statements contained in the volumes of the Penny Cyclopædia, there is now presented a nearly unbroken view of the properties and analyses of the organic bodies alluded to.

For the facts connected with this part of the subject we are chiefly indebted to the elaborate work of Liebig on Organic Chemistry, and any one who will refer to it cannot fail to ob-serve how necessarily incomplete must be the account which we can give in the space to which we are limited.

Although this supplement contains so large a proportion of organic chemistry, we trust it will be found that other materi points, in so vast and important a field as that of the scienc treated of, have not been neglected.

ACETAL, a compound first formed by Döbereiner, and cal by him oxygenated æther. To prepare it, put into a tall wi mouthed bottle about an inch of alcohol, and suspend over some watch-glasses containing precipitated platina (plat black) moistened with water, and near the surface of alcohol.

After the bottle has been left for some months in a wa place, it is found to contain an acid liquid consisting of ace aldehyde, acetic acid, and acetic æther. It is to be satura by the addition of chalk, and to be repeatedly treated w chloride of calcium, till it is no longer moistened, and soon as the boiling-point rises to 202° the product is p acetal, possessing the following properties:—It is a thin lourless liquid, of a pungent æthereal odour: its densit 0·823, and its boiling-point 204°. It is soluble in seven p of water, and miscible with alcohol in all proportions. W mixed with an alcoholic solution of potash, it gradually abs oxygen from the air, and gives rise to aldehyde-resin.

Its formula is $C^8 H^9 O^3$, and may be regarded as a co pound of æther and aldehyde. It is composed of

Eight equivalents of Carbon	.	6 × 8 = 48
Nine equivalents of Hydrogen		1 × 9 = 9
Three equivalents of Oxygen	.	8 × 3 = 24
Equivalent	.	. 81

ACETONE, *Pyroacetic Spirit*, is obtained by the decompo tion of acetic acid. It is best prepared by heating dry aceta of lead gradually to redness in a coated glass retort, to whi a receiver is adapted and kept cool. Carbonic acid ga evolved, and in the receiver there condenses a volatile produ contaminated with tar. This, which is the crude acetone to be saturated by the addition of an alkali, and then rectif from chloride of calcium in a water-bath; acetone is al formed, with other products, when acetic acid in vapour passed through a red-hot iron tube.

The properties of acetone are, that it is a colourless limp liquid; its odour is peculiar, penetrating, and somewhat a matic; its specific gravity is 0·792; it boils at 132°, and density of its vapour is 2·019. It mixes in all proportio with alcohol, æther, and oil of turpentine. It is very infla mable, and is not affected by exposure to the air. It is co posed of

Three equivalents of Carbon	.	6 × 3 = 18
Three equivalents of Hydrogen		1 × 3 = 3
One equivalent of Oxygen	.	8
Equivalent	.	. 29

Its formula is $C^3 H^3 O$, and results from the separation acetic acid into acetone and carbonic acid. Acetone may be obtained by distilling sugar, starch, or gum, with ei times their weight of lime.

ACONITINA, a vegetable alkali which exists in aco itum *Napellus*) in combination with an acid which een called *aconitic acid*. It crystallizes from a solution ute alcohol in white grains; it is also often obtained in tate of a vitreous, transparent, compact mass. It is in-us, but it is intensely bitter and acrid. It is extremely ous; 1-50th of a grain is sufficient to kill a sparrow in a inutes, and a tenth of a grain instantly. It dilates the

It is very slightly soluble in cold water, unalterable air, very fusible, and not volatile; its alkaline reaction y distinctly marked; it requires 50 parts of boiling to dissolve it, and the solution does not become turbid ling; it is very soluble in alcohol and in æther.

salts of aconitina which have been hitherto examined crystallize, but dry in the state of a bitter gummy mass, is acrid and very poisonous.

ning nitric acid dissolves it without colour; concentrated ric acid colours it at first yellow and then reddish violet. olution is precipitated in abundant white flocculi by in- of galls; it is not precipitated by solution of platina, cture of iodine gives with it a kermes-coloured precipi- It is employed in medicine, and directions are given preparation in the London Pharmacopœia. It does not to have been analysed.

ers, Silicic. These compounds have recently been d by M. Ebelman by the following process:—Cau- pour absolute alcohol into chloride of silicium, and a action takes place, with an abundant disengagement of loric acid gas, and a considerable reduction of tem-; when the weight of the alcohol added rather ex- at of the chloride of silicium, no further disengagement s perceived, and the liquor becomes sensibly warm. ubjected to distillation, hydrochloric æther first passes d afterwards the greater part of the liquid distils be- 20° and 340° Fahrenheit; the latter product is to be and the distillation continued, until it terminates at 70° Fahrenheit: there remains a mere trace of silica in rt.

roduct obtained between 320° and 338° being recti- il its boiling-point became fixed between 323° and olourless liquid was obtained, possessing a penetrating ereal odour, a strong hot taste, and a density of 0·932. oes not combine with it, but decomposes it very slowly, eposit of silica; it is perfectly neutral to test-papers; and æther combine with it in all proportions; the solutions of the alkalis decompose it rapidly, and the parate from it gelatinous silica. When a few drops wn upon red-hot platina, combustion occurs with a me, and silica is deposited in the state of impalpable The density of its vapour is 7·18.

alysis it appears to consist of

e equivalent of Silica or Silicic Acid	.	16
e equivalent of Oxide of Ethyl or Æther	.	37
Equivalent		53

mbol is, $SiO\ C^4H^5O$.

eceiving in separate portions the product distilled 338° and 570°, the carbon and hydrogen were con- ound to be in the same proportion in the æther, but the silica was increased with the temperature; the istilled at above 570° is colourless, has a weak smell, ste different from the æther above described. Its s 1·035. The action of water and the alkalis upon pound is similar to that upon the æther already men- Analysis indicates that it contains twice as much the foregoing, and that its formula is $2SiO,\ C^4H^5O$. bove-described æthers are extremely curious com- wing to the volatilization of the silica in combination yl, an effect produced only besides by fluorine.

ens, Animal and Vegetable. The composition of bumen has been ascertained by Mülder; the results greatly differ from those which have already been cept that the proportions of the very small quantity of us and sulphur which it contains are stated.

dred parts consist of

Carbon	54·84
Hydrogen	7·09
Oxygen	21·23
Azote	15·83
Phosphorus	0·33
Sulphur	0·68
	100·

phorus and sulphur, though small in quantity, have been considered as in chemical combination, and the formula of albumen has been stated to be $C^{400}\ H^{310}\ O^{120}\ N^{50}\ PS^2$; so complex a constitution is, however, highly improbable.

Vegetable albumen is composed of

Carbon	55·01
Hydrogen	7·23
Oxygen, sulphur, and phosphorus	21·84
Azote	15·92
	100·

Alcarsin and Alcargen. [Cacodyl, in Chemistry, P. C. S.]

Aldehyde, or Hydrated Oxide of Acetyl, the hypothetical base of acetic acid. When the vapour of alcohol or æther is passed through a red-hot tube, aldehyde is one of the products. It may be procured also by mixing 6 parts of sulphuric acid, 4 of spirit, and 4 of water, to which mixture is to be added 6 parts of powdered binoxide of manganese, contained in a large retort, with a cooled receiver adapted to it: by a gentle heat about 6 parts are to be distilled; the product is to be twice distilled from an equal weight of chloride of calcium, and then to be mixed with twice its volume of æther, and saturated with dry ammoniacal gas; by these means a white crystalline compound is obtained, which is to be dried by exposure to the air. This is to be distilled from a water-bath with a mixture of equal parts of sulphuric acid and water. When rectified at a temperature not exceeding 87°, the aldehyde is obtained in a state of purity.

The properties of aldehyde are—that it is a limpid colourless liquid, having an æthereal and suffocating smell; its specific gravity is 0·790; it boils at 72° Fahrenheit, and mixes in all proportions with water, alcohol, and æther; it is neutral to test-paper: but when exposed to oxygen it is partly converted into acetic acid. Its formula is $C^4H^4O^2$, or $AeO+HO$; or it consists of

Four equivalents of Carbon	.	$6 \times 4 = 24$
Four equivalents of Hydrogen	.	$1 \times 4 = 4$
Two equivalents of Oxygen	.	$8 \times 2 = 16$
Equivalent	. .	44

Its name is derived from *alcohol dehydrogenatus*, it being equal to 2 equivalents of alcohol when deprived of 2 equivalents of hydrogen.

When combined with ammonia, *aldehyde-ammonia* is formed, which, as already noticed, is a crystalline body; when heated with potash, a brown resin-like substance is produced called *aldehyde-resin*. When long kept it is apt to undergo two isomeric modifications, one called *elaldehyde*, which is liquid, and the other *metaldehyde*, a solid compound. Aldehyde combines with and dissolves phosphorus, sulphur, and iodine; by chlorine and bromine it is decomposed, yielding hydrochloric or hydrobromic acid, and some oleaginous products which contain chlorine and bromine; dilute nitric acid, by imparting oxygen, converts it into acetic acid.

Aldehydic Acid is obtained by dissolving oxide of silver in aldehyde, and decomposing the solution by means of hydrosulphuric acid. An acid liquid is obtained which is very readily decomposed; its formula is $C^4H^3O^2+HO$; it appears to contain the elements of acetic acid minus an equivalent of oxygen.

Alizarin. [Madder, P. C.]

Allotoin, Allantoic Acid. This substance exists in the allantoic liquid of cows, and has since been obtained by Liebig and Woehler artificially by treating uric acid with binoxide of lead: one part of the acid is to be boiled in two parts of water, and the binoxide of lead is to be added in small portions at a time, as long as it continues to alter in colour; the solution is to be filtered and evaporated until crystals begin to form at the surface; the crystals obtained on the cooling of the liquor are to be purified by repeated crystallization. It may also be procured from the allantoic liquid of cows by evaporating it with a gentle heat to one-fourth of its volume. The crystals obtained on cooling, are to be treated with animal charcoal, and are then pure.

The properties of allantoin are—that it has the form of brilliant colourless crystals derived from the rhomboid, with a vitreous appearance. It is insipid, does not act upon vegetable colours, dissolves in 160 parts of cold water, and in much less when boiling. It is soluble in nitric acid, and decomposes by boiling in it without evolving nitric oxide; it dissolves, when heated, in the carbonated alkalis, and crystallizes unaltered from their solutions; but when boiled in caustic potash

it is decomposed into ammonia and oxalic acid, which combine. By analysis allantoin appears to be composed of

Four equivalents of Carbon	6 × 4	= 24
Three equivalents of Hydrogen	1 × 3	= 3
Two equivalents of Azote	14 × 2	= 28
Three equivalents of Oxygen	8 × 3	= 24
Equivalent		79

Its formula is $C^4\ H^3\ N^2\ O^3$.

ALLOXAN. This substance is obtained by the action of nitric acid on uric acid in the following manner: Add, by small portions at a time, 1 part of uric acid to 4 parts of nitric acid of specific gravity 1·41 or 1·5; the uric acid dissolves with effervescence and the disengagement of heat, which must be moderated by cooling the vessel. Small white granular brilliant crystals are gradually formed, and the liquor soon becomes a mass of them; this is to be allowed to drain in a funnel, and then dried on a porous brick; they are to be purified by repeated crystallization from solution in boiling water.

When alloxan crystallizes from a solution which is not saturated, the crystals have the form of an octohedron with a rhombic base, and they are colourless, transparent, very brilliant, often an inch in diameter; they are very efflorescent, and lose 25 per cent. = 6 equivalents of water. When a hot saturated solution of alloxan is made to crystallize, anhydrous alloxan is obtained in oblique rhombic prisms.

Alloxan is very soluble in water; it possesses a disagreeable smell, and a somewhat astringent saline taste. It reddens vegetable colours, and renders the epidermis purple. The alkalis decompose it with the formation of alloxanic acid, and when heated to ebullition with an alkali it is converted into urea and mesoxalic acid; it is converted into alloxantin by sulphuretted hydrogen; when subjected to the combined action of an alkali and a protosalt of iron, an indigo blue liquor is produced.

It contains

Eight equivalents of Carbon	6 × 8	= 48
Four equivalents of Hydrogen	1 × 4	= 4
Two equivalents of Azote	14 × 2	= 28
Ten equivalents of Oxygen	8 × 10	= 80
Equivalent		160

Its formula is $C^8\ H^4\ N^2\ O^{10}$.

ALLOXANIC ACID. This is produced by the action of the alkalis upon alloxan, and when sulphuric acid is added to alloxanate of barytes, the acid remains in solution, which is very sour, and by evaporation yields crystals in needles radiating from a common centre. It neutralizes bases perfectly, and decomposes the carbonates; when neutralized by ammonia it gives a white precipitate in solution of silver, which becomes yellow by ebullition, and afterwards black with effervescence. It dissolves zinc with the evolution of hydrogen gas.

It is composed of

Four equivalents of Carbon	6 × 4	= 24
One equivalent of Hydrogen		= 1
One equivalent of Azote		= 14
Four equivalents of Oxygen	8 × 4	= 32
Equivalent		71

Its formula is $C^4\ H\ NO^4$.

ALLOXANTIN. This substance was first observed by Dr. Prout during the decomposition of uric acid by nitric acid. It may be obtained from alloxan; but the best method appears to be that of boiling uric acid in 32 parts of water, and then adding a little nitric acid until it is perfectly dissolved; the solution is then to be evaporated to two-thirds; in a day or two alloxantin is deposited in crystals, which are to be purified by re-crystallization. The crystals are colourless, and in the form of oblique four-sided prisms; they become red when exposed in the air to ammonia; they are hard, fragile, easily reduced to powder, and may be heated to 212° without losing weight; but at 302° they lose 3 equivalents, or 15·4 per cent. of water.

Alloxantin is slightly soluble in cold, but more soluble in hot water; the solution reddens litmus; when heated in a solution of chlorine, it is converted into alloxan; with the salts of silver it produces a black precipitate of metallic silver. The alkalis decompose it; barytes water produces a violet *precipitate*, which is destroyed by heat.

It is composed of

Eight equivalents of Carbon	6 × 8	= 4
Ten equivalents of Oxygen	8 × 10	=
Five equivalents of Hydrogen	1 × 5	=
Two equivalents of Azote	14 × 2	=
Equivalent		1

Its formula is $C^8\ O^{10}\ H^5\ N^2$.

ALUMINA. The compounds of this substance alkalis have been called *aluminates*, this earth, metallic oxide, being assumed to act the part of an ac combinations; and nature presents us with compounds it is combined with the alkaline earths, lime and ma

Lately, however, a crystalline and definite alu potash has been formed: it may be prepared eithe solving alumina, precipitated by carbonate of am potash, or by fusing in a silver crucible anhydro with excess of potash. If the solution, obtained mode, be evaporated under the receiver of an air-pu when sufficiently concentrated, readily deposit hard crystals of aluminate of potash: this salt always re alkaline solution, and may be crystallized a second t

Aluminate of potash is white, very soluble in w insoluble in alcohol; it has a caustic taste and a reaction; a certain quantity of water decomposes i tates alumina nearly pure, and retains in soluti alkaline aluminate.

One hundred parts of this salt, previously dried yielded—

Alumina . . .	40·6
Potash . . .	37·5
Water . . .	21·2
	99·3

It appears therefore to be a teraluminate of p sisting of

Three equivalents of Alumina	18 × 3	= 54 o
One equivalent of Potash .		= 48
Three equivalents of Water .	9 × 3	= 27
Equivalent		129

Aluminate of soda may be formed in the sa aluminate of potash, but it crystallizes less readily.

AMMELIDE is prepared by dissolving ammeline, melamine, in concentrated sulphuric acid, and treat lution with alcohol; the precipitated ammelide is to with cold water till all adhering acid is removed; it be purified by dissolving in nitric acid and preci carbonate of ammonia.

The properties of ammelide are—that it is a whi insoluble in water, alcohol, and æther, but dissol alkalis and the powerful acids; with nitric acid crystalline compound which is decomposed by wa long exposed to the action of nitric acid or of sulp diluted and boiling, it is completely decomposed int and cyanuric acid. When nitrate of silver in sli and afterwards ammonia are added to a hot and sa lution of ammelide in nitric acid, a white flocculent is formed: this consists of ammelide in which two of water are replaced by two equivalents of oxide This compound is insoluble in water, blackens by to the light, and dissolves in nitric acid.

The formula of ammelide is $C^{12}\ H^9\ N^9\ O^6$.

AMMELINE. This substance may be obtained by one process: when melam is dissolved in boiling dil chloric acid, there are obtained by evaporation crystal chlorate of ammeline and of melamine, which are to b in boiling water. When ammonia is added to the precipitate of ammeline is obtained, which is to be

The properties of ammeline are, that it is of white colour, and is composed of very fine silky is insoluble in water, alcohol, and æther, but solul caustic alkalis. When subjected to dry distillation produced ammonia, mellon, and a crystalline subli dissolves in acids, and yields crystallizable salts, with nitric acid, with which it forms large lamin quadrangular prisms. It is however a weak basis, only with strong acids, and never with organic acid fused with hydrate of potash, ammeline is converte monia and cyanate of potash.

Its formula is $C^6\ H^5\ N^5\ O^2$.

AMIDES AND AMIDOGEN. Under AMMONIUM, have mentioned the supposed existence of a su called, derived from ammonia, possessing metallic

g of 4 equivalents of hydrogen and 1 equivalent
has also been supposed that another compound
h it has never been isolated, which consists of 2
of hydrogen and 1 equivalent of azote; this is
exist in certain compounds called *amides*, and as
base is termed *amidogen*, so that ammonia, on
nmonium, gains 1 equivalent of hydrogen, while
amidogen, it loses 2 equivalents of the same ele-
n potassium is heated in ammoniacal gas, the
erted into a fusible green matter, which appears
e amide of potassium, an equivalent quantity of
ing disengaged during its formation.
e also produced by the abstraction of the elements
a compounds of the oxygen acids and ammonia;
nhydrous sulphuric acid in vapour is mixed with
gas, a saline substance is produced, which, when
water, does not give the usual indications of con-
uric acid, nor does it contain ammonia, but it is
be what is termed a *sulphamide*, containing water,
nges which occur appear to be these:—The sul-
ields one of its 3 equivalents of oxygen to com-
ne of the 3 equivalents of hydrogen which the
tains, and these consequently form an equivalent
en there remains a compound of 1 equivalent of
equivalents of oxygen, and a compound of 1 equi-
te + 2 equivalents of hydrogen, constituting ami-
his uniting with the compound of sulphur and 2
f oxygen yields sulphamide, represented by NH^2,
which, differently arranged, represent an equi-
ydrous sulphate of ammonia, or NH^3, SO^3.
e way, when oxalate of ammonia is heated, the
a equivalent of oxygen and the ammonia an equi-
rogen, there is produced what is termed *oxamide*.
P. C.]

of Ammonia . . $NH^3\ C^2\ O^3+2HO$
the elements of Oxamide $NH^2\ C^2\ O^2$

There are left $H\ \ O+2HO$

IN, a substance obtained from bitter almonds after
has been expressed. Its properties are—that it
of small, white, pearly, crystalline plates, which
and nearly tasteless. Amygdalin is decomposed
aling a peculiar odour and leaving a bulky coal.
luble in water, both hot and cold; a hot solution
iant prismatic crystals in cooling, which contain
en heated with dilute nitric acid, or with a mix-
sulphuric acid and binoxide of manganese, it is
ammonia, bitter almond oil, and benzoic, formic,
acids.
of

quivalents of Carbon	6 × 40 = 240
-seven equivs. of Hydrogen	1 × 27 = 27
-two equivalents of Oxygen	8 × 22 = 176
ivalent of Azote	= 14
Equivalent	457

a is $C^{6}H^{27}O^{22}N$.

, the poisonous principle of the *upas antiar*. It
pearly crystals, soluble in 27 parts of boiling
lso in alcohol, but scarcely in æther; it cannot
without decomposition. Introduced into a wound
ings on vomiting, convulsions, and death.
of

n equivalents of Carbon	6 × 14 = 84
uivalents of Hydrogen	1 × 10 = 10
uivalents of Oxygen	8 × 5 = 40
Equivalent	134

a is $C^{14}H^{10}O^{5}$.

e name given by its discoverer, M. Braconnot, to
principle of parsley, obtained from it by solution
n cold water and alcohol it is nearly insoluble,
readily in either of them when heated, the so-
ned gelatinizing as they cool. The solution has
our. Apiin is soluble in the alkalis and in lime-
olutions are yellow, and when an acid is added,
ipitated in a gelatinous state. When it is boiled
cids, apiin undergoes a peculiar modification. If
tity of sulphuric acid be added to a boiling solu-
, it soon becomes turbid, and is converted into a
ish fluid. On filtration after cooling, and satu-
acid with chalk, a small quantity of sugar remains in solution; the portion precipitated becomes of a yellowish white colour after washing and drying, and weighs but little less than the apiin submitted to experiment: it is neutral, inodorous, insipid, and insoluble in cold water, but it dissolves in boiling water or alcohol; the solutions do not gelatinize on cooling, but precipitate in white opaque flocculi.

. S., No. 43.

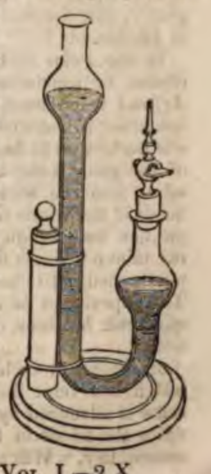
Apiin dissolves in concentrated sulphuric and hydrochloric acids, and is precipitated from them by water in the state above described: M. Braconnot inclines to the opinion that this is pure apiin, and that that which gelatinizes is a compound of apiin with one of the substances which the acids convert into sugar, an operation after which the apiin is exhibited in its proper character. Apiin produces a characteristic action with protosulphate of iron, producing with it a blood-red colour, which is so intense that about 16 grains of it dissolved in five gallons of water visibly colour it. The apiin which does not gelatinize produces the same effect: a solution of it in boiling water gives a blood-red precipitate with a solution of the salt of iron. With nitric acid apiin yields carbazotic acid and some traces of oxalic acid.

Apophyllic Acid is obtained from *cotarnina* [Chemistry, P. C. S., p. 342], and is not formed with certainty. It crystallizes with or without water; in the latter case the crystals have the form of rhombic octohedrons, which are colourless: the cleavage faces have a pearly lustre resembling apophyllite, and hence the name bestowed on this acid. The crystals lose water, when heated, even under water, and become white without altering their form: they contain 9 per cent. of water, and are but little soluble in water. A saturated boiling solution yields long prismatic crystals on cooling, which do not effloresce; the acid which crystallizes from a solution that has not been boiled, has the cubo-octohedral form, and contains water.

This acid has a slightly acid and astringent taste; it reddens litmus-paper, and it is insoluble in alcohol and in æther. The salts which it forms with bases are soluble; the ammoniacal salt crystallizes in tables, and is very soluble; the salt of silver, formed by double decomposition, is after a certain time deposited in stellated crystals, which gradually increase in size; they explode at a moderate heat with the same violence as oxalate of silver; the residue is as black as charcoal, and after combustion leaves metallic silver. It has not been analyzed owing to the small quantity hitherto obtained by M. Wöhler, its discoverer.

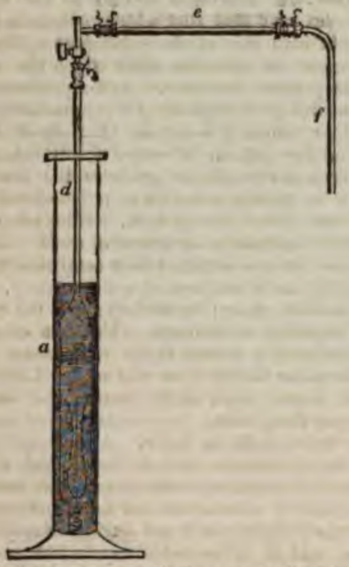
Arabin. [Gum, P. C.]

Arsenic, *Detection of*. In addition to the modes of detecting arsenic already given, we may describe that proposed by Mr. Marsh, which is of unquestionable delicacy, and may be adopted in conjunction with that of reducing the oxide to its metallic state; indeed it is such in point of fact. The liquid suspected to contain the poison is acidulated with sulphuric acid and placed in contact with metallic zinc, both of which must be previously ascertained to be free from arsenic; if any arsenic be present in the liquid, the hydrogen gas generated reduces and dissolves it, forming arsenuretted hydrogen gas. This gas is to be lighted at a jet, and a piece of white porcelain or of glass is to be held over the flame, when, if any arsenic be present, a brilliant black spot of metallic arsenic is deposited on the glass or porcelain. It has been supposed that antimony will produce similar results, but it is stated in reply to this, that arsenic when received on glass is nut-brown by transmitted light, while that from antimony is grey-black, and both are opaque at the centre. The annexed drawing represents a convenient form of instrument for the purpose: it consists of a bent tube, having two bulbs blown upon it, fitted with a stop-cock and narrow jet. Slips of zinc are to be put into the lower bulb, which is afterwards to be filled with the acidulated liquid to be examined; on replacing the stop-cock, closed, the hydrogen gas, or arsenuretted hydrogen gas, as the case may be, collects and forces the fluid into the upper bulb, which then acts by its hydrostatic pressure, and expels the gas through the jet as soon as the stop-cock is opened.



The other method of proceeding is to boil a slip of bright metallic copper in the fluid suspected, previously acidulated with hydrochloric acid. If arsenic be present, the copper is covered with a whitish alloy, and then by heating the metal in a test tube, the arsenic is volatilized, and sublimes in the metallic state in the cold part of the glass. This method is susceptible of detecting very minute portions of arsenic.

The scientific committee of the Prussian government has suggested an improvement in Marsh's apparatus, which in the opinion of Berzelius surpasses all other modifications on account of the certainty and distinctness of the result. The annexed figure shows the simple arrangement of the apparatus :—



a is a glass tube 1¼ inch in diameter and 10 inches long, contracted at the lower extremity to an aperture half an inch in diameter. It should be of thick glass, so as to possess the requisite strength. A glass tube *d*, 2 lines in width and 20 inches long, is joined to the upper end, which is likewise contracted. A brass stop-cock is fixed, by means of a short caoutchouc tube, air-tight, to the upper extremity of this tube, closed at the summit, and provided with a short lateral tube at a right angle with it, to which a narrow straight glass tube, 8 inches in length, *e*, is connected, air-tight, by means of caoutchouc. To the other extremity of tube *e*, a second descending tube *f*, bent at right angles, is affixed.

Some strips of zinc, ascertained to be free from arsenic, are inserted in the tube *a* through the inferior aperture; they should be of such length as to reach to two-thirds of the tube, in which they are maintained by a spirally-wound copper wire, which is likewise inserted through the inferior aperture. The tube, thus arranged, is placed in a glass cylinder, whose inner diameter is rather greater than required to admit it, and from 16 to 18 inches in height.

The acid liquor to be tested for arsenic is poured into this cylinder to such a height, that when the tube *a* is filled with it, it stands 1 or 2 lines above the connexion of *a* with *d*. The cock is then opened, so that the liquid may enter and fill the tube, when it is again closed. The zinc now dissolves, and the liquid is forced back again through the inferior aperture of *a* into the cylinder. If any froth is formed in the operation, as is usually the case, the apparatus is shaken gently, that the zinc strips may destroy the froth, and cause it to subside.

In the mean time the tube *e* is heated to redness in the centre, or somewhat nearer to the cock, by means of an Argand spirit-lamp, the open extremity of the tube *f* being immersed in water contained in a convenient vessel; and when *e* is perfectly red-hot, the cock is opened sufficiently to admit of the gas passing in slowly successive bubbles through the tube *f* into the water. It must not be allowed to proceed faster if the whole of the arsenic is to be deposited from the gas, on its passage over the incandescent part. As soon as the tube *a* is again filled with liquid, the cock is closed, and not opened until the whole of the liquid has been expelled. The experiment is continued in this manner until a quantity of arsenic has been deposited sufficient to apply the necessary tests.

In order to collect gradually the whole of the arsenic which has been deposited near the incandescent spot, the flame is advanced by degrees as far as the centre of the tube, when the whole of the arsenic will be contained in the half *nearest to f.* When the cork is closed, the tube is filled with hydrogen gas, and we are able to test by sublimat the body deposited has the volatility of arsen whether it sublimes at a gentle heat; and con ascertain whether it is pure arsenic, or accompa other less volatile bodies, antimony for instance. is then collected so as to form a ring in the int tube, which, when it has become cold, is removed, one substituted for it; and the arsenic is colle manner in fresh tubes as long as the liquid affords

The glass tube which has been removed is cu near the place where the arsenic is collected, and in a small glass containing fuming nitric acid, i arsenic is dissolved with the assistance of heat. obtained is then evaporated over a water-bath on a to dryness, to drive off the nitric acid. Arsenic a in water, while antimonic acid, or oxide of anti soluble. The arsenic acid, when mixed with ne of silver, yields a brick-red precipitate of arsenia The arsenic collected in the second tube is not this manner, but sealed at both ends, and preserve sented as evidence.

The third tube should be of rather greater order that after the arsenic has been collected hydrogen gas expelled by air, the arsenic may in it and sublimed as arsenious acid, when the usu form of the crystals may be recognised by the glass. The arsenious acid may be then washe water containing a little ammonia to test it wit silver.

The zinc and sulphuric acid employed in these are previously submitted to examination in the a order to ascertain that they are free from arsenic.

The great advantage of the above-described stated to be that none of the arsenic is lost, as menter has it in his power to regulate the passag through the heated tube as slowly as he chooses, engagement of gas may be stopped at pleasure, if stance should require delay.

Asparagin, a peculiar substance obtained fro and also from marshmallow root; it is also con potato, liquorice-root, and beet-root.

It crystallizes in transparent, limpid, colourless is inodorous, has a mawkish disagreeable taste, hard; it dissolves more plentifully in hot water and is dissolved by dilute alcohol, but is insolubl alcohol, æther, and in oils, both volatile and fixed

Acids, as well as the alkalis, decompose it w but not when cold: the results are aspartic acid a

It consists of

Eight equivalents of Carbon	6 × 8 =
Eight equivalents of Hydrogen	1 × 8 =
Six equivalents of Oxygen	8 × 6 =
Two equivalents of Azote	14 × 2 =
Equivalent	

Its formula is $C^8 H^8 O^6 N^2$.

Aspartic acid contains 3 equivalents less of hy 1 less of azote.

Bell-metal, an alloy of copper and tin, to whic portions of zinc, and it is even stated of lead, ar added. According to Dumas, the most famous consists of four parts of copper and one part of tin not far from four equivalents of copper and one eq tin. [**Bronze**, P. C.; **Bell-Casting**, P. C. S.]

Benzile. In order to obtain this compound chlorine gas is passed into melted benzoin till the hydrochloric acid ceases. The mass obtained by be dissolved in boiling alcohol, which as it cools d benzile.

Benzile crystallizes in six-sided prisms; they are inodorous, and tasteless, and of a sulphur yellow c fuse at about 200°, are insoluble in water, but alcohol and æther; volatile without decomposing, an aqueous solution of potash, even when boiled dissolved in an alcoholic solution of this alkali, and with the production of a blue colour and of b Formula $C^{14} H^5 O^2$, which is the same as that of

Benzilic Acid.—Formed by boiling benzoin an alcoholic solution of potash, in which they dis with a violet colour, which disappears by contin small portions of potash are to be added occasion as it causes any blue colour, after the previous port decolorized by boiling; the solution is then to b

ed by hydrochloric acid, which separates a resinous
to the filtered solution excess of hydrochloric acid
and on cooling the benzilic acid crystallizes.

operties of this acid are—that it is in the form of
, brilliant, transparent, rhombic crystals, or in long
crystals; it is sparingly soluble in cold water, but
more readily in boiling water. It melts at 248°, and
latilized; at a higher temperature benzoic acid is
accompanied with violet vapours, and a residue of
Concentrated sulphuric acid dissolves it cold, and
a bright crimson colour.

rmula of benzilic acid is $C^{28}H^{11}O^5+HO$, or two
ts of benzile and one equivalent of water.

c acid combines with bases to form salts, and of these
h and silver salts have been examined: the former
es in large transparent crystals, which are soluble
and in alcohol; the latter salt is a white crystalline
insoluble in water; its formula is $C^{28}H^{11}O^5$, AgO.

IDE is one of the ingredients of crude bitter almond
ystallizes in laminæ or white acicular crystals, which
light and have a pearly lustre. Benzimide is inso-
ater, very slightly dissolved by boiling alcohol, and
re soluble in pyroxilic spirit; it melts at 332°, is
mmable, and burns with a red sooty flame; it is dis-
d decomposed by concentrated hydrochloric, nitric,
ric acids; the latter solution has a deep indigo blue
d becomes emerald green in moist air; this reaction
eristic of benzimide. Its formula is $C^{28}H^{13}O^4N$.

EN. [Hydrogen—*Carburets*, P. C.]

LE denotes the hypothetical radicle of a series of com-
hich are produced from the volatile oil of the bitter
r are connected with it by certain relations. Indeed
lready stated [Benzoic Acid, P. C.] that benzule is
ed basis of that acid, to which it gives rise when com-
h an additional equivalent of oxygen. Although it
been isolated, yet it is imagined to exist, since, like
it appears to act the part of a compound base or
It is composed of 14 equivalents of carbon = 84, 5
s of hydrogen = 5, and 2 equivalents of oxygen =
g its equivalent 105. Its formula is $C^{14}H^5O^2$, and
Bz. We shall now state the compounds of benzule
to be added to those already given.

, *Hydruret of*. When the residue of bitter almonds
h the fixed oil has been expressed is distilled with
product of the operation is bitter almond oil, which
ppear to exist previously in the almonds. This oil
enzoin, benzoic acid, and hydrocyanic acid; to purify
de into a thin paste with water, hydrate of lime,
de of iron, and redistilled; the oil which passes
eed from admixture with water by exposure to
f calcium. Hydruret of Benzule, when pure, is a
t limpid fluid, of a strong peculiar odour, and
aste; its specific gravity is 1·043; it refracts light
nd boils at 356°. It is soluble in 30 parts of water,
with alcohol and æther; its vapour is inflammable,
with a smoky flame; when exposed to the air it
ygen and is converted into a mass of benzoic acid.
ated with solid hydrate of potash, it disengages
and yields benzoate of potash. The crude product,
xtremely poisonous, is however sometimes used for
custards, &c.

nposed of benzule combined with an equivalent of
and its formula is $C^{14}H^5O^2+H$, or Bz + H: its
is 106.

, *Chloride of*. This is prepared by passing a cur-
lorine through anhydrous hydruret of benzule, until
ic acid ceases to be evolved; the yellow mixture ob-
o be heated until it becomes colourless.

loride of benzule is a colourless liquid, which
a peculiar, very strong, and disagreeable odour,
cts the eyes; its specific gravity is 1·106; it boils
its vapour is inflammable, and it burns with a
e which is green on the edges. Cold water slowly,
ater more readily, converts it into hydrochloric and
cid. When treated with the alkalis, an alkaline
nd chloride are produced. It dissolves phosphorus
r without any change; when added to protochloride
orus, great heat is excited, and there are produced
e of phosphorus and an oily substance. Ammoniacal
poses it into benzamide and hydrochloric acid; by
yields oxide of ethyl and hydrochloric acid; æther
huret of carbon produce no change in it.
nposed of 14 equivalents of carbon = 84, 5 equivalents of hydrogen = 5, 2 equivalents of oxygen = 16, 1 equivalent of chlorine = 36; its equivalent is 141, its formula $C^{14}H^5O^2Cl$, or Bz Cl.

Benzule, Bromide of, is prepared in the same way as the chloride. Its properties are—that it forms colourless scaly crystals, which by exposure to the air become brown; water and the alkalis decompose it, as they do the chloride; æther and alcohol dissolve it without change. Its formula is $C^{14}H^5O^2Br$, or Bz Br.

Benzule, Iodide of, is prepared by distilling a mixture of chloride of benzule and iodide of potassium; the result of their action is a crystalline mass, coloured brown by an excess of iodine; when pure, the crystals are colourless, but they become brown by exposure to the air; water and the alkalis decompose it. Its formula is $C^{14}H^5O^2I$, or Bz I.

Benzule, Sulphuret of, is obtained by distilling a mixture of sulphuret of lead and chloride of benzule; the product is a soft crystalline mass, which has a very unpleasant smell; boiling water acts but little upon it, but potash converts it into sulphuret of potassium and benzoic acid. It dissolves unchanged in alcohol and æther, and is combustible. Its formula is $C^{14}H^5O^2S$, or Bz S.

Benzule, Cyanide of, is prepared by distilling chloride of benzule with bicyanide of mercury. The product is a yellow oil, which is rendered colourless by rectification. It has a very strong smell, similar to that of cinnamon, which causes tears; its taste is sweetish with an after taste of hydrocyanic acid: it is very inflammable.

Blue, Prussian. [Blue, P. C.]

Bresilin, the colouring-matter of Brazil wood, or Fernambuc (*Cæsalpinia crista, brasiliensis, &c.*). In its pure state this colouring principle is a compact mass, of a deep yellowish red colour, very soluble in water and in alcohol. The aqueous solution is of a reddish yellow colour, and becomes more red by exposure to the air, and paler by the addition of a little sulphuric, hydrochloric, or nitric acid, but reddens by excess of acid, and is precipitated in flocculi. Sulphuretted hydrogen and sulphurous acid decolorize it; strong acids restore the red colour of the solution. Alkalis alter the colour to violet. Phosphoric, sulphuric, hydrochloric, nitric, and citric acids, &c., first render Brazil-wood paper red and then yellow, or even at once yellow; sulphurous acid bleaches it. It is composed of carbon 63·324, hydrogen 3·967, oxygen 34·709, in 100 parts.

According to Chevreul, pure bresilin crystallizes in small acicular crystals of an orange colour, which are partly volatilized by heat, and partly decomposed into a liquid containing acid and ammonia. Nitric acid converts it partly into carbazotic acid.

Bromal, a colourless oleaginous liquid, obtained by the action of bromine upon alcohol; it possesses a very strong and peculiar odour, which excites tears; its taste is caustic; its density 3·34; boils below 212°. It does not act upon vegetable colours, and combines with water, alcohol, and æther. Chlorine and fuming nitric acid decompose it. It dissolves sulphur and phosphorus without altering them. Caustic alkalis convert it into an alkaline formiate and perbromide of formule. Its formula is $C^4HO^2Br^3$. It forms a crystalline solid when combined with water.

Bromine, P. C. Some late experiments seem to prove that the equivalent of bromine is 80, rather than 79 adopted in Bromine, P. C.

Bromoform. This compound is obtained by distilling a mixture of bromide of lime with alcohol and water. It is a heavy liquid, its specific gravity being 2·10. It is volatile. By potash it is converted into bromide of potassium and formiate of potash. Its formula is C^2HBr^3.

Brucia, a vegetable alkali discovered by Pelletier and Caventou. It exists in the bark and seeds of the nux-vomica and in St. Ignatius's bean. Brucia crystallizes by spontaneous evaporation from dilute alcohol, in prismatic crystals, which are colourless, transparent, and often some lines in thickness, and sometimes in stellated needles, or in pearly scales. Brucia is inodorous, has a very bitter taste, and is poisonous. It is unalterable in the air, requires 850 parts of cold and 500 parts of boiling water for solution; it is very soluble both in absolute and dilute alcohol, slightly soluble in volatile oils, and insoluble in æther and fixed oils.

According to Liebig, brucia consists of 44 equivalents of carbon = 284, 25 equivalents of hydrogen = 25, 2 equivalents of azote = 28, 7 of oxygen = 56. Its equivalent is therefore 393. Its formula is $C^{44}H^{25}N^2O^7$.

Anhydrous brucia, obtained by fusing the crystals, has a waxy appearance; the crystals contain about 16·6 per cent. of water.

It combines with acids to form salts, which are readily obtained by dissolving it in them previously diluted. They possess the following properties:—They are mostly soluble and crystallizable, and have a bitter taste; they are decomposed by ammonia and the fixed alkalis, and by morphia and strychnia, all of which precipitate the brucia; on the addition of tannic acid tannate of brucia is thrown down; nitric acid renders the salts of brucia red.

Bryonin is the peculiar principle of bryony-root to which its power is owing: it is a yellowish white substance, sometimes with a red or brownish tint; its taste is at first rather sweet, then styptic and extremely bitter. It is soluble in water and in alcohol, but insoluble in æther; chlorine does not decompose it; sulphuric acid dissolves it, acquiring first a blue and afterwards a green colour. When decomposed by heat it yields ammonia. Alkalis do not alter it: the aqueous solution is precipitated white by nitrate of silver, and yellow by chloride of gold; white by protonitrate of mercury and by diacetate of lead; tincture of galls precipitates it of a bright grey colour. It is a drastic purgative, and poisonous in too large doses.

Cacodyl *and its Compounds.*—Arsenious acid and acetate of potash are to be accurately mixed and put into a glass retort, to which a cooled receiver is adapted, with an apparatus to carry off the incondensible gaseous product, which is chiefly carbonic acid. When the heat has been long continued, some metallic arsenic and two liquids are found in the receiver: the lighter consists mostly of water, with acetic acid and acetone; and the heavier is impure oxide of cacodyl, or alcarsin, formerly called the *liquor of Cadet*.

The product is obtained in a pure state by repeated washing with water free from air, and redistillation from hydrate of potash in a retort containing hydrogen gas; this operation, on account of the poisonous nature of alcarsin, must be conducted in the open air.

The properties of this substance are—that it is a colourless liquid; its density is 1·462; its smell is extremely disagreeable, and the vapour affects the eyes and nose. Water dissolves little of it, but alcohol takes it up readily; it boils at about 300°, and solidifies, becoming a white crystalline mass, at 9°. By exposure to the air a dense white smoke is emitted, the alcarsin becomes hot, and afterwards burns spontaneously with a pale flame, producing arsenious acid, carbonic acid, and water. It is composed of 4 equivalents of carbon=24, 6 equivalents of hydrogen=6, 2 equivalents of arsenic=76, 1 equivalent of oxygen=8. Its formula is $C^4H^6As^2O=Kd\,O$.

Chloride of Cacodyl.—Mix a dilute alcoholic solution of oxide of cacodyl with one of bichloride of mercury, avoiding an excess of the latter; by their mutual action a colourless inodorous crystalline precipitate is obtained; and when this is distilled with hydrochloric acid, there are formed water, bichloride of mercury, and chloride of cacodyl, the latter coming over; this is subjected to the action of lime and chloride of calcium, and then distilled in a retort containing carbonic acid gas. The chloride of cacodyl thus produced is a colourless liquid; its odour is more disagreeable and its vapour more poisonous than that of the oxide of cacodyl; it does not fume when exposed to the air, but its vapour, which is colourless, is spontaneously inflammable in it. It is heavier than and insoluble in water; alcohol combines with it readily, but æther does not; its boiling-point is a little above 212°. Its formula is KdCl.

Cacodyl. It is from the chloride of cacodyl that this base is immediately obtained. Digest slips of zinc in chloride of cacodyl for three hours, in a glass bulb blown upon a glass tube previously filled with carbonic acid gas. The zinc dissolves without the evolution of any gas; when the residual white saline mass is treated with water, the chloride of zinc dissolves, and a heavy oily liquid separates, which is cacodyl, and is rendered pure by cautious distillation from a fresh portion of zinc.

Its properties are—that it is a thin, transparent, colourless liquid, much resembling the oxide in odour, and is so very inflammable, that when poured into oxygen, chlorine, or the air, it immediately takes fire; it boils at 338°; when cooled to 21° it crystallizes in large transparent square prisms. It is heavier than water, and being nearly insoluble in it, sinks when added to it. Alcohol and æther dissolve it. Its formula is $C^4H^6As^2=Kd$.

Cacodylic Acid. Alcargen.—When cacodyl or its oxide is left under water to the slow action of the air, they oxidize and become cacodylic acid; or it may be prepared by adding oxide of mercury to oxide of cacodyl, covered with
water, and artificially cooled until the mixture loses
any cacodylate of mercury, which may have been f
to be decomposed by the cautious addition of more ox
codyl; by evaporation to dryness and solution in alcoh
of cacodylic acid are obtained, which have the follow
perties: they are colourless, brittle, brilliant, prismatic
permanent in a dry atmosphere, but deliquescent i
one. Cacodylic acid is insoluble in æther, but dis
alcohol, and the solution has an acid reaction; it
combination with the alkalis and evaporation a gumm
it forms crystalline compounds with the oxides of
mercury. Its symbol is KdO^3.

Cacodyl combines with iodine, sulphur, cyanog
various other bodies, yielding compounds which h
particularly described by Bunsen, and of which an
may be seen in Turner's 'Chemistry' and Graham
ments,' and also in Liebig's 'Organic Chemistry.'

Cantharidin. Spanish flies contain a crystalline
discovered by Robiquet. In order to isolate it, the
to be digested in water; the solution is to be evap
dryness, and treated with boiling alcohol; the alco
lution is to be evaporated to dryness, and treated wit
which dissolves the cantharidin and by spontaneous ev
deposits it in the state of micaceous particles, which
purified from some yellow matter by washing with al

The properties of cantharidin are—that when pa
insoluble in water; but very soluble in boiling alco
crystallises from it as the solution cools. It is
soluble in oils, but neither acetic nor hydrochloric
solves it; it melts when heated, and sublimes without
posing, at a high temperature. It is to this princi
cantharides owe their blistering power.

According to Regnault, cantharidin consists of
61·68, hydrogen 6·04, and oxygen 32·28, or $C^{10}H$

Capnomor is a colourless, limpid, volatile oil, obt
Reichenbach, with several other products, from the
of tar: its odour resembles that of ginger, and it has
after taste. Its density is 0·9775. It is perfectly
boils at 345° Fahrenheit, and distils unaltered; it b
a sooty flame; it is very slightly soluble in water,
solves in alcohol, æther, essential and fixed oils. It
phosphorus, sulphur, and selenium. It combines w
rine, emitting hydrochloric acid. It mixes with
acid, and imparts to it a red colour; nitric acid conve
oxalic acid, carbazotic acid, and another crystalline
which has not yet been examined. Acetic acid
capnomor, and it dissolves several organic acids;
and sodium act but slightly upon it, and the alkalis
line earths decompose it but slowly. It has not b
lysed.

Carthamin and Carthamein. The yellow c
matter of carthamus is to be extracted by water, and
to be sprinkled with a very dilute solution of carbonat
which dissolves the carthamin; this is to be precipit
salt of lead, and the oxide of lead separated by hydro
acid. By this treatment a yellow solution is obtain
by spontaneous evaporation yields small prismatic
of pure carthamin. Its properties are—that
slightly bitter taste, and is only sparingly soluble in
When exposed to the air it becomes yellow. Sulph
when cold, dissolves it without alteration, but whe
it blackens; hydrochloric acid and nitric acid do not
colour, but dissolve it when heated; when exposed o
cury to oxygen gas, it becomes after some days
yellowish; but if a little alkali be added to it, it bec
mediately yellow, and then passes rapidly to a ros
It is in this state that the acids, and particularly cit
precipitate it from the alkali, possessing the well-kno
rose-colour. This red colour is called by M. Prei
thamein. When carthamin is mixed with an alkali, it
become coloured without the presence of oxygen. A
produces this effect but slowly; neutral acetate of lea
to a solution of carthamin, produces a white precipitat
first becomes yellow and then rose red, by exposure t

Carthamin submitted to analysis appeared to b
posed of

Twenty-six equivalents of Carbon	156	or	76
Nine equivalents of Hydrogen	9		4
Five equivalents of Oxygen	40		19
Equivalent	205		1

Formula $C^{26}H^9O^5$

rystals contain 2 equivalents of water = 18, which
when heated.
umein is composed of

enty-six equivalents of Carbon	156	or	70·59
e equivalents of Hydrogen	9		4·07
en equivalents of Oxygen	56		25·34
Equivalent	221		100·

mula is $C^{26} H^{9} O^{7}$.
umein which has been decolorized and rendered
y exposure to the action of the sun and air, con-

nty-four equivalents of Carbon	144	or	69·57
n equivalents of Hydrogen	7	,,	3·35
n equivalents of Oxygen	56	,,	27·05
Equivalent	207		100·

mula is $C^{24} H^{7} O^{7}$.
alts from the preceding analysis, that carthamin in
ith air and an alkali combines with two equivalents
and becomes red carthamein; and when exposed to
and the sun's rays, it absorbs six equivalents of
nd is rendered yellow.
is the basis of the various kinds of cheese, and closely
albumen in many properties. It is insoluble in
t a small portion of alkali renders it soluble: it may
ed by adding dilute phosphoric acid to fresh milk
a coagulum is produced, which after being washed
issolved in a weak solution of carbonate of soda, and
be kept in a warm place to allow of the separation
tter; these re-solutions in carbonate of soda and pre-
s are to be repeated several times, and the insoluble
then to be washed with boiling water, and treated
r, to remove any remaining butter or fatty matter.
thus prepared is a curdy white substance, insoluble
r alcohol, but soluble by water containing an alkali
onate; dilute acids also dissolve a small portion of
moist, it reddens litmus-paper, and leaves about 0·3
of ashes by incineration. Casein is coagulated by
nimal membranes, as is shown in the process of
heese, in which, by the action of a piece of the
of the calf, milk is separated into a yellowish liquid
hey, and a solid white coagulum which contains all
n of the milk with portions of some of its other

ing to the analysis of Mulder, casein consists of

Carbon	54·96
Hydrogen	7·15
Azote	15·80
Oxygen	21·73
Sulphur	00·36
	100·

nd that albumen, fibrin, and casein differ only in
iculars—the two first contain both phosphorus and
ut in different proportions; while the last contains
hur.
sis, *Catalytic Action. An Action of Presence.* The
ysis has been applied by Berzelius to a very obscure
enomena, in which a substance, by its mere presence,
tain changes, either of composition or decomposition,
self undergoing any change whatever. Thus when
f potash and binoxide of manganese are mixed and
e salt is decomposed and yields oxygen gas at a
er temperature than it would do without the presence
tallic oxide, which however suffers no decomposition
whatever. This affords an instance of decompo-
catalytic force. An example may be given in which
on is perhaps occasioned by the same force; thus
all particle of finely divided platina is dropped into
of oxygen and hydrogen gases, they immediately
with explosion and the formation of water, and
cted without any change in the state of the platina;
wever been supposed, that in this case the com-
effected by the power of the platina, owing to its
tended surface, in condensing the gases so as to
m within the sphere of their mutual attractions.
n of yeast in fermentation has been considered also
stration of catalytic action; the presence of this
, though invisible, is sufficient to cause the resolution
nto alcohol and carbonic acid gas, an effect which
produced by any other means whatever. An ex-
the action of catalytic power in an organic secretion is afforded by the presence of the minute quantity of the vegetable principle *diastase*, which appears in the germination of barley and other seeds, and converts their starch into sugar and gum, which, being soluble, form the sap that rises into the germ, and nourishes the plant.

CEDRIRET, a peculiar substance obtained by Reichenbach from the lighter oil of hard-wood tar: this is to be treated first with carbonate of potash, and afterwards with caustic potash, to separate the eupion and other substances, and the potash is then saturated with acetic acid; by this an oil separates, of which some remains in solution with the acetate of potash, and may be obtained by distillation. As soon as the liquid which comes over precipitates protosulphate of iron red, it is to be preserved, and is cedriret.

The properties of this substance are—that it crystallizes in a solution of protosulphate of iron, in red, slender, inflammable crystals. Heat decomposes it; sulphuric acid dissolves it with a blue colour, and nitric acid decomposes it completely. It is insoluble in water, alcohol or æther, oil of turpentine or petroleum, but dissolves in creasote with a purple colour, and is precipitated from it by alcohol in a crystalline state. It is probably to the presence of this substance that the different colours of wood-tar are owing. It has not been analyzed.

CHAMELION MINERAL. [MANGANESE—*Manganic Acid*, P. C.]

CHLORINE. M. Pelouze has found that 100 volumes of water dissolve the under-mentioned volumes of chlorine gas at the temperatures stated:—

Volumes of Chlorine Gas.	
175 to 180	at 32° Fahrenheit.
270 275	48°
270 275	50°
250 260	53°
200 210	57°
155 160	86°
115 120	104°
60 65	149°

Dr. Draper has found that when chlorine gas is exposed to the direct solar rays it undergoes a permanent change, which it retains in the dark. This modification consists in the property which the gas acquires of immediately combining in this state even in the dark, and without the assistance of light or heat, with hydrogen gas, to form hydrochloric acid gas. Dr. Draper attributes this property to the combination of the chlorine with the *tithonic rays*, which the chlorine retains until they can be employed.

CHLORIODIC ACID, a compound of chlorine and iodine, which on account of its acid properties was termed an acid by Davy, but by Gay-Lussac simply *choride of iodine*, he being of opinion that the acidity of its solution arises from the presence of hydrochloric and iodic acids, generated by the decomposition of water.

Iodine, when dry, absorbs chlorine at common temperatures with the evolution of heat; when the iodine is perfectly saturated with chlorine, the compound is orange-yellow, but reddish-orange if the iodine be in excess. By heat it is converted into a yellow-coloured liquid, yielding a vapour of the same colour when the temperature is increased. It is deliquescent, readily soluble in water, and forms a colourless solution which is very sour to the taste, first reddens and then destroys vegetable blue colours. It probably consists of 1 equivalent of chlorine 36, and 1 equivalent of iodine 126 = 162.

CHLOROCINNOSE, a compound produced by the action of chlorine upon oil of cinnamon. When pure, it exists in the state of brilliant, colourless, acicular crystals, which fuse and volatilize by heat without change. Even when heated in concentrated sulphuric acid it is not decomposed, nor is it altered by heating in ammoniacal gas. It consists of 18 equivalents of carbon, 4 of hydrogen, 4 of chlorine, and 2 of oxygen. Its formula is $C^{18} H^{4} Cl^{4} O^{2}$. It appears that its formation depends upon the displacement of 4 equivalents of hydrogen from oil of cinnamon by 4 equivalents of chlorine.

CHLOROCYANIC ACID. [CYANOGEN, CHLORIDE OF, in CHEMISTRY, P. C. S.]

CHLOROSAMIDE, CHLOROSALICYMIDE. This compound is prepared by causing chloride of salicyle to absorb dry ammoniacal gas. The result is a yellow mass, which is insoluble in cold water, and decomposed by it when boiling. It is soluble in boiling æther; and, as the solution cools, it separates in iridescent crystals of a yellow colour. It is soluble also in absolute alcohol. When heated in an acid it is decomposed, yielding an ammoniacal salt of the acid employed, and chloride of salicyle. By the action of the fixed alkalis ammonia is evolved, and chloride of salicyle remains in solution. It results from the combination of 2 equivalents of ammonia with 3 equivalents of chloride of salicyle, and the separation of 3 equivalents of water. Its formula is $C^{42}\ H^{15}\ N^{2}\ O^{6}\ Cl^{3}$.

Chrysen. This substance was obtained by Laurent from pitch or gas tar by repeated distillation. The products which come over last consist of a soft reddish or yellow mass, and of a thick oil, in which crystalline plates are visible. That which condenses in the neck of the retort consists principally of chrysen, so called from its golden colour, while the receiver contains pyren. [Pyren, in Chemistry, P. C. S.] These products are separated by æther, in which the pyren only is soluble. When the æthereal solution is placed in a freezing mixture the pyren crystallizes.

Chrysen is yellow, crystalline, inodorous, and tasteless. It is insoluble in water or alcohol, and not very soluble in æther. Boiling oil of turpentine dissolves a small quantity of it, which afterwards separates into crystals. Warm concentrated sulphuric acid dissolves it, and it assumes a beautiful green colour. Nitric acid, chlorine, and bromine all decompose chrysen. It melts at about 450° Fahrenheit, and at a higher temperature volatilizes, with partial decomposition. Its composition is similar to that of idrialin; or it is a tercarburet of hydrogen, composed of 18 carbon and 1 hydrogen. Its formula is $C^{3}H$.

Cinchovatina, a vegetable alkali discovered by Manzini in *cinchona ovata;* it is extracted in the same manner as quina and cinchonia. Cinchovatina is insoluble in water, but dissolves in alcohol; and the solution yields large colourless inodorous prisms, which after some time have a bitter taste. It has an alkaline reaction. It melts between 356° and 374° Fahrenheit.

The salts of cinchovatina are soluble, and crystallize very readily, especially on the cooling of saturated boiling solutions; it is soluble in ammonia, and crystallizes from the solution by evaporation. It appears to consist of 46 equivalents of carbon = 276, 27 equivalents of hydrogen = 27, 2 equivalents of azote = 28, and 8 equivalents of oxygen = 64, giving 395 as its equivalent. Its formula is $C^{46}\ H^{27}\ N^{2}\ O^{9}$.

Codeia, an alkali discovered by Robiquet in opium, is obtained as an accidental product in the preparation of hydrochlorate of morphia by Gregory's process. This salt is to be dissolved in water, and the morphia is to be precipitated by caustic ammonia. This alkali does not throw down the codeia; and it therefore remains in solution. By evaporating the solution, a double salt of hydrochlorate of codeia and hydrochlorate of ammonia is obtained: and this, after being squeezed, is to be washed with a small quantity of water, and then treated with a solution of potash, which separates the codeia in the form of a tenacious mass, which eventually hardens and becomes crystalline: this is to be treated with æther, which dissolves the codeia, and this separates by evaporation, especially if a little water be added.

Codeia crystallizes in regular octohedrons, which are colourless and transparent. They have a bitter taste, a strong alkaline reaction, are very soluble in alcohol and in æther, but insoluble in solutions of the fixed alkalis, which distinguishes codeia from morphia. It does not redden nitric acid, nor render chloride of iron blue.

Codeia is much more soluble in water than morphia, 1 part requiring about 80 parts of cold water and 17 of boiling water for solution. When heated in a small quantity of water it liquefies, and forms oleaginous drops, which are heavier than water. Its composition is denoted by the formula $C^{35}\ H^{20}\ NO^{5}$.

Codeia forms salts with acids, some of which crystallize, as is the case with the nitrate. Their solutions are precipitated by tincture of galls, which produces no effect on the salts of morphia.

Conia, Conicina, an alkali obtained from hemlock (*Conium maculatum*). It is procured from the seeds or fresh leaves of the plant by distillation with water holding some potash in solution. When pure, it has the following properties:—It has the appearance of a colourless volatile oil, and is lighter than water, its specific gravity being 0·89. Its odour is powerful, diffusible, and repulsive, somewhat like that of hemlock itself. It is intensely acrid to the taste. It has a strong alkaline reaction on turmeric-paper. It combines readily with and neutralizes acids; and some of the salts which it forms with them have been obtained in a crystalline state. It is sparingly soluble in water, and what is remarkable is, that it is
more soluble in cold water than in hot. It imparts
and taste to water. Alcohol mixes with it in all pro
and it also dissolves readily in æther. With about o
of its weight of water it forms a hydrate. By expos
air it quickly becomes of a dark colour, and spontane
composes with the evolution of ammonia. Its boilin
370° Fahrenheit. It distils however with boiling w
suffers partial decomposition.

It is one of the most virulent poisons known, d
small animals by a very small quantity and in a v
time.

Its composition has not been determined with certa
it is probably represented by $C^{16}\ H^{16}\ N$, or 16 equi
carbon, 16 of hydrogen, and 1 of azote.

Cotarnina, an organic alkali obtained from nar
the action of sulphuric acid and oxide of manganese,
subsequent tedious operations.

Cotarnina assumes the form of a radiating ma
readily soluble both in water and in alcohol, and
to them an intense yellow colour. It has a v
taste, and a slightly alkaline reaction. When it is
melts, carbonizes, and emits a disagreeable odour.
coal which it leaves is difficult of incineration.

It combines with and saturates acids. When
with hydrochloric acid it dries into a yellow amorph
in which crystalline nuclei are occasionally visible.
kalis do not precipitate it from solution in hydrochl
but it is precipitated by bi-chloride of mercury, c
platina, and by tannic acid. M. Wohler, who disco
acid, states that he is not quite satisfied with the
results which he has hitherto obtained. These gav
69·3; hydrogen, 6·1; azote, 6·3; oxygen, 18·
parts.

Cyanogen, Chloride of, *Chlorocyanic Acid.*
pound is obtained when anhydrous hydrocyanic a
posed to chlorine gas acted upon by the sun's ray
chloric acid being also formed. The properties of
stance are, that it has the form of long colourles
which have a powerful and disagreeable odour. T
fuse at 284°, and sublime unaltered at a higher te
It dissolves in alcohol and æther without decomp
when heated with water, it is decomposed into cy
hydrochloric acids. It was probably owing to the
of these acids that chloride of cyanogen was origi
posed to possess acid properties; and hence the
chlorocyanic acid. It may be considered as comp
equivalents of chlorine 108 + 3 equivalents of
78 = 186. Its formula is $Cl^{3}\ Cy^{3}$.

Chlorine and cyanogen form another compound,
gaseous. It is obtained by passing chlorine gas i
hydrocyanic acid, or by conveying chlorine over moi
of mercury excluded from the light.

This compound is a colourless gaseous body,
pungent, and soluble in water, alcohol, and æt
zero it forms a colourless crystalline mass, and
melts into a liquid which boils at 11°. When subj
pressure of four atmospheres it assumes a liquid form
long kept it is converted into the solid chloride just d
so that the two compounds are isomeric. It is co
1 equivalent of chlorine 36 + 1 equivalent of
26 = 62. Its formula is Cl Cy.

Cyanuric Acid. This acid was discovered by S
the distillation of uric acid; more lately Serullus o
by another process, and described it under the name
acid; and lastly Wohler and Liebig examined its co
and properties.

This acid is formed under various circumstances,
decomposition of solid chloride of cyanogen by w
decomposition of soluble cyanates by dilute acid, an
tillation of uric acid, &c.

In order to prepare it, the best process seems to be
dry melam [Melam, in Chemistry, P. C. S.] with
heat in concentrated sulphuric acid; the solution
poured into 20 or 30 parts of water, and the mixtur
kept for several days, at a temperature near ebu
until small portions yield no white precipitate with
The solution is then to be evaporated to its crystalliz
and the crystals obtained are to be purified by r
zation.

Cyanuric acid forms rather small colourless prism
tals, which are efflorescent. It is very slightly
cold water and requires 24 parts of boiling water t
it; it is inodorous, has but little taste, and reddens

is a remarkably permanent substance, being so- out decomposition in concentrated sulphuric or though when heated in them it is eventually de-

g to Liebig, the crystallized acid consists of 3 of cyanogen 78, 3 equivalents of oxygen 24, ts of water 63, equivalent = 165: 3 equivalents he considers to constitute the acid a hydrate, and alents are water of crystallization. It combines valents of base to form cyanurets, and is therefore ned a tribasic acid. By exposure to a very high 1 equivalent of hydrated cyanuric acid is decom- equivalents of hydrated cyanic acid; and urea is verted into cyanuric acid and ammonia.

s. An isomeric modification of starch procured ommon starch in dilute sulphuric acid and also in acids; by this treatment the starch soon loses its and becomes thin and limpid, being converted into called from its action on polarized light, in causing polarization to deviate to the right. When sulphu- d, it is to be saturated by the addition of chalk, and iltered from the sulphate of lime formed, is to be o dryness in a water-bath.

thus obtained is a white gum-like mass, without nce of crystallization, soluble in cold water, and from it by alcohol. Iodine is stated by some stimes to produce no change in the solution of d on other occasions to give a purplish red tint. duction of colour has, however, been stated to be perfect conversion of the starch.

may also be prepared by the action of an infusion some time at 150°. Its composition is similar to h. Dumas gives as its formula $C^{24} H^{10} O^{10}$.

ebullition is continued after the formation of the s substance is converted into grape sugar, and this luced with great readiness.

but not quite pure, is used by calico-printers as a r gum; it is obtained by merely subjecting starch of heat, and thus prepared is known by the name um.

, a substance formed during germination. It is reducing freshly germinated barley into a pulp, weight of water, and then pressing out the liquor To the clear liquid just sufficient alcohol is to be troy its viscidity, and allow of its being filtered; by ted substance is precipitated, which must be con- egetable albumen, since it coagulates at 167° F. rated this, alcohol is to be again added as long as comes turbid; the precipitate is to be purified by ater and precipitation by alcohol repeatedly; the s at last to be dried in thin layers upon glass at a between 104° and 122° F.

erties of diastase are the following:—It is solid, rystalline, soluble in water, but insoluble in alcohol weak; the aqueous solution is nearly tasteless, and chemical action, not precipitating subacetate of aqueous solution quickly changes, becoming acid; undergoes the same change in a longer time, but in water the alteration is immediate. Common d in general not to contain more than 1-500th of f diastase; one part of it is sufficient to convert of starch, thickened with water, into a mixture much dextrine and a little sugar. It has not yet d absolutely pure.

a is a metal recently discovered in cerite. Cerite ields, by treatment with sulphuric acid, large red ich are sulphate of didymium: when potash is olution of this salt, hydrated oxide of didymium is ; it has a bluish violet colour, and during washing rbonic acid from the air, and when dried it con- of carbonate of didymium and is of a light reddish ; by exposure to a red heat the carbonic acid is d the oxide is obtained in small lumps of a brown colour; the powder is light brown: if this oxide to a white heat it assumes a dirty greyish green has no alkaline reaction, and is dissolved pretty by dilute acids, and they yield salts of an ame- colour; they are not precipitated by hydrosul- nmonia unless heated; the oxide is insoluble in ammonia.

lowpipe the oxide mixed with the salt of phos- nes amethystine red with a tint of violet; when carbonate of soda or platina foil, it melts into a greyish white mass. It does not appear to have been reduced to the metallic state.

Dimorphism. [Isomorphism, P. C.]

Elaterin, a vegetable principle extracted from the wild cucumber (*Momordica Elaterium*). To obtain it the evaporated juice of the fruit is to be treated with water, and the residue with alcohol of specific gravity 0·825; and the solution is to be evaporated to the consistence of a syrup: the elaterin then crystallizes; more is afterwards obtained by adding potash to the mother water; the matter obtained is to be purified by means of æther. Another process consists in pouring water into the concentrated tincture of elaterium, by which the elaterin is precipitated in the state of small silky crystals.

Elaterin has a bitter and somewhat styptic taste. It is insoluble in water, and in dilute acid and alkaline solutions; it is soluble in 5 parts of cold alcohol and 2 parts of boiling alcohol, and also in æther and fixed oils. It melts at a few degrees above 212°, and at a higher temperature it is volatilized in very acrid white vapours.

Concentrated acids decompose it: nitric acid converts it into a yellow gummy mass; sulphuric acid dissolves it, and assumes a deep blood-red colour.

Elaterin acts strongly as an emetic or purgative, in doses of 1-12th or 1-10th of a grain. It has not been analyzed.

Erbium, a metal discovered by Mosander associated with yttria. Its properties are but little known; some of them are as follows:—Its oxide becomes of a dark orange colour when heated in contact with the air, which colour it loses with a little weight when heated in hydrogen gas; it is to the presence of this oxide that yttria owes its yellow colour, when prepared as hitherto directed; the sulphate and nitrate of erbium are free from colour. It does not appear to have been reduced to the metallic state.

Fibrin, Animal. The bodies of animals contain this substance both in a fluid and a solid state; in the former it exists in the blood, and in the latter form in muscular fibre, but that of venous differs from that of arterial blood. To obtain the former, human blood is to be triturated in a mortar with 1½ times its weight of water, and one-third of its weight of nitre; and the mixture is to remain, during at least 24 hours, exposed to a temperature of about 100° to 120° F., by this it is rendered slimy and gelatinous, and at length it becomes liquid, exhibiting the properties of albumen which has been treated with acetic acid. When largely diluted with water, a flocculent substance is thrown down, which closely resembles coagulated albumen. When arterial blood is employed in the same way similar changes are not produced, and the fibrin of venous blood loses the property if it has absorbed oxygen.

Solid fibrin is procured by washing thin portions of muscular flesh in cold water until they are rendered quite white, or in a purer state by stirring fresh blood with a stick to which the fibrin adheres: it is to be rendered pure by washing first with cold water, and afterwards by treatment with æther. Fibrin, when fresh, exists in the state of long, white, elastic filaments; it is inodorous, tasteless, and insoluble in water whether cold or hot, but by long continued boiling a portion is dissolved. When dried at a gentle heat it loses about four-fifths of its weight, which loss is water, and it becomes then horny and translucent, and very much resembles albumen which has been coagulated; acetic acid and fresh fibrin when kept for some hours in contact form a transparent gelatinous mass which is soluble in water; solution of potash dissolves fibrin, and the compound possesses many of the characters which belong to albumen.

According to Mulder dried fibrin consists of

Carbon . .	54·56
Hydrogen . .	6·90
Azote . .	15·72
Oxygen . .	22·13
Phosphorus . .	·33
Sulphur . .	·36
	100·

If it be admitted that the phosphorus and sulphur are in definite combination, the formula of this substance will be $C^{400} H^{310} N^{50} O^{120} PS$, which certainly includes a very unusual amount of equivalents. Its composition is precisely similar to that of coagulated albumen, and, as already remarked, they have several properties in common.

Fibrin, Vegetable, is obtained from wheat flour by the following process:—Make the flour into a paste, and wash it on a fine sieve with a small stream of water; the *gluten* of the flour will remain, and a milky liquid will pass through the sieve, which when suffered to rest will in a few hours become clear by depositing the starch by which it was rendered turbid. If this clear liquor be boiled, a flocculent precipitate is formed in it, which, when washed, dried, and purified by boiling æther, has the same composition as animal fibrin. When heated, it coagulates, and possesses the properties of coagulated albumen.

Formomethylal, Methylal, a liquid obtained by distilling a mixture of two parts of pyroxylic spirit with three of sulphuric acid, three of water, and three of binoxide of manganese. The liquid which distils is to be saturated with potash, and by this the new compound is separated as a light oily fluid; this is to be purified by rectification, and it then has the following properties: it is colourless, of an agreeable aromatic odour; its density is 0·855, boils at 107° F., and is soluble in three parts of water. It is very inflammable, and burns with a white flame. Its composition is expressed by $C^3H^4O^2$.

Fraxinin, a neutral principle obtained from the bark of the *Fraxinus excelsior*, and at first supposed to be an alkali. It is prepared by precipitating the aqueous solution of the extract of the bark with di-acetate of lead, and this is treated with hydrosulphuric acid, and the liquid is to be evaporated; when fraxinin is obtained in slender hexagonal prisms, which are unalterable in the air.

Fraxinin is very soluble in water and in alcohol, and but slightly so in æther. It has a very bitter taste, and has neither an alkaline nor acid reaction. It does not appear to have been analyzed.

Fumaric Acid, an acid obtained from fumitory by boiling its juice, filtering it, and precipitating it by acetate of lead; by this fumarate of lead is obtained, which is to be decomposed by hydrosulphuric acid.

This acid may also be procured by heating malic acid in a retort, and by its decomposition fumaric acid is obtained, which when purified has the following properties:—It is in the form of small, white, crystalline laminæ; they dissolve in about 200 parts of cold water, but are readily dissolved by hot water and by alcohol; nitric acid, even when heated, does not act upon this substance. Hydrated fumaric acid contains C^4HO^3+HO, and is consequently isomeric with aconitic acid.

Furfurina, a substance artificially formed by Mr. Fownes, which possesses the properties of a vegetable alkali, and forms salts with acids. It is procured, with *furfurol*, a volatile oil, by distilling a mixture of bran, sulphuric acid, and water. Its formula is $C^{30}H^{12}N^2O^6$.

Gases, Liquefaction of.—We have shown that eight gases have been liquefied by Mr. Faraday (vol. xi. p. 84); and a few months ago he read a paper before the Royal Society, in which he shows the condensation and solidification of various other gases. The method which he employed consisted in combining the condensing powers of mechanical compression with that of very considerable depression of temperature. The first object was attained by the successive action of two air-pumps; the first having a piston of one inch in diameter, by which the gas to be condensed was forced into the cylinder of the second pump, the diameter of whose piston was only half an inch. The tubes into which the air, thus further condensed, was made to pass, were of green bottle-glass, from one-sixth to one-quarter of an inch in external diameter, and had a curvature at one portion of their length adapted to immersion in a cooling mixture: they were provided with suitable stopcocks, screws, connecting pieces, and terminal caps, sufficiently air-tight to sustain a pressure of fifty atmospheres. Cold was applied to the curved portions of the tube by their immersion in a bath of Thilorier's mixture of solid carbonic acid and æther. The degree of cold thus produced, when the mixture was surrounded by the air, was—106° Fahr., by an alcohol thermometer. But on placing the mixture under an air-pump, and removing the atmospheric pressure, leaving only that of the vapour of carbonic acid, which amounted only to one twenty-fourth of the former (that is, to the pressure of a column of 1·2 inch of mercury), the thermometer indicated 166° below zero. In this state the æther was very fluid, and the bath could be kept in good order for a quarter of an hour at a time. Mr. Faraday found that there were many gases which, on being subjected to cold of this extreme intensity, condensed into liquids, even without a greater condensation than that arising from the ordinary atmospheric pressure, and they could then be preserved, sealed up in glass tubes in this liquid state. *Such was* the case with chlorine, cyanogen, ammonia, sulphuretted hydrogen, arseniuretted hydrogen, hyd
hydrobromic acid, carbonic acid, and euchlorine. W
to some other gases, such as nitric oxide, fluosilicon,
gas, it was difficult to retain them for any length of
tubes, in consequence of the chemical action they
the cements used in the joinings of caps, and other
apparatus. Hydriodic and hydrobromic acids co
tained either in a solid or liquid state. Muriati
did not freeze at the lowest temperature to whic
be subjected. Sulphurous acid froze into tran
colourless crystals, of greater specific gravity than
out of which they were formed. Sulphuretted
solidified in masses of confused crystals of a whi
at a temperature—122° Fahr. Euchlorine was
verted from the gaseous state into a solid crystall
which by a slight increase of temperature melte
orange red fluid. Nitrous oxide was obtained s
temperature of the carbonic acid bath *in vacuo*, an
peared as a beautifully clear and colourless crystall
Mr. Faraday conceives that in this state it might,
cases, be substituted with advantage for carbonic a
gorific processes, for arriving at degrees of cold
those hitherto attained by the employment of the
stance. Ammonia was obtained in the state of
crystals, and retained this form at a temperature
The following liquids could not be made to freeze
chlorine, æther, alcohol, sulphuret of carbon, ca
camphor, and rectified oil of turpentine. The follo
showed no signs of liquefaction when cooled by th
acid bath, even when subjected to great pressure
and oxygen at a pressure of twenty-seven atmospher
and nitric oxide fifty atmospheres, carbonic oxide
pheres, coal-gas thirty-two atmospheres.

Gelatine. [**Food**, P. C.]

Gliadine, a peculiar azotised vegetable matter
in small quantity with the gluten of wheat, and
adhesive properties are owing. It may be separat
ing alcohol, together with a thick fluid oil which
by æther. Gliadine is adhesive, insoluble in water,
it is hard and translucent like horn; it dissolves in
and solution of potash. No analysis of this substa
believe, yet appeared.

Glucose. [**Sugar**, P. C.; **Grape**, P. C.]

Gluten. [**Food**, P. C.]

Glycerin, a substance discovered by Scheele, a
him the *sweet principle of oil*. It may be obtained b
of caustic alkalis on oil of olives, or by boiling the oi
of lead and water; in this operation, as is well
insoluble soap of lead is formed, and the glycerin
solution; this is to be treated with hydrosulphuric
throws down any oxide of lead which may be
and the liquid, after digestion with animal charco
filtered, and evaporated in vacuo, without heat.
perties of this substance are:—When pure it i
colourless viscid liquid of specific gravity 1·27; it
made to crystallize. Its taste is extremely sweet,
water in all proportions, and is not fermentabl
heated a portion first volatilizes, and the remaind
dark coloured, and is eventually decomposed. By
and decomposition of nitric acid it is converted
acid. It is composed of 6 equivalents of carbon, 8
of hydrogen, and 6 equivalents of oxygen.

Glycyrrhizine. [**Sugar**, P. C.; **Liquorice**,

Hematosin, the red colouring-matter of the blo
not however been obtained in a perfectly pure stat
the difficulty of separating it from other substances,
facility with which it undergoes change: when th
of blood, which has been drained, is put into
colouring matter dissolves and forms a fine crimso
solution; this when exposed to a moderate heat
forms a brittle dark red substance, which is again
water. When it has been acted upon by heat
it coagulates, owing to the albumen which it contai
then insoluble in water, but soluble in potash; the r
is rendered black by carbonic or sulphurous ac
colour is heightened by air on account of the oxyge
contains; nitrous oxide renders it purple, and s
hydrogen greenish black.

A peculiarity of hematosin is its containing oxid
which does not occur in other parts of the anim
when the clot of blood is decomposed by exposure
air, the residue treated with hydrochloric acid exhi
usual tests the presence of peroxide of iron, unaccou

phoric acid. So also when dried blood is moistened with le concentrated sulphuric acid, on the addition of water a ion is obtained which with ammonia yields a precipitate roxide of iron.

he hematosin of bullocks' blood, but not quite pure, for easons already stated, analyzed by Mulder, yielded the wing ingredients:—

Carbon . . .	66·49	65·91
Azote . . .	10·54	10·54
Hydrogen . .	5·30	5·37
Oxygen . . .	11·01	11·75
Iron . . .	6·66	6·58
	100·	100·15

mipinic Acid is formed by the higher oxidizement of ic acid [Opianic Acid, in Chemistry, P. C. S.], one equi- t of which, by the addition of one equivalent of oxygen, rise to two equivalents of hemipinic acid; this addition fected by heating either opianic acid or narcotina with e sulphuric acid and binoxide of lead, care being taken decompose the hemipinic acid as it is formed.

mipinic acid crystallizes in colourless quadrilateral s. The crystals contain two equivalents of water, which pelled below 212° Fahr. It has a slight taste, is soluble ter, melts at 356°, and sublimes like benzoic acid in g laminæ. It forms with ammonia a readily soluble ystalline salt; with oxide of silver it forms an insoluble, pulverulent powder, the composition of which is repre- by that of the hemipinic acid, $C^{10} H^{4} O^{5} + Ag O$.

peridin, a neutral vegetable principle obtained from ngy part of the peel of oranges and lemons, by digest- n boiling water, and saturating the infusion with cream , then evaporating to dryness, treating the residue with , and evaporating the filtered solution. The matter o be treated with twenty times its weight of distilled , and the solution set by for a week, when the hespe- s deposited, and is to be purified by recrystallizations cohol.

properties of Hesperidin are:--It forms white silky , grouped in tufts or in mammillated forms; they dcrous, insipid, fuse at a gentle heat into a resinous ce which becomes electrical by friction; at a higher ature, this substance decomposes without yielding am- and burns with flame and an aromatic odour. It is le in cold water, and requires sixty parts of boiling or solution; it is very soluble in boiling alcohol, but le in æther. Nitric acid renders hesperidin yellow; ic acid gives it first a yellow and then a red tint; hy- ric acid imparts a greenish yellow colour to it. The solution of hesperidin is not decomposed by water; hate of iron precipitates it brownish red: it is soluble alkalis. No analysis has as yet been made of Hes- .

opinic Acid, a product of the decomposition of nar- y heat, which on being melted and exposed to a tem- e of 428° is suddenly decomposed, with considerable cence, into ammonia and a brown vesicular substance, onsists chiefly of the acid in question.

acid is a dark brown amorphous body, which melts on e to heat, and burns with a bright flame, diffusing an esembling that of narcotina. It is soluble in water, cids, and in alcohol, giving with the latter a deep red- d solution. With the alkalis it forms saffron-yellow d solutions, which give dark brown precipitates with s of barytes and lead. When humopinic acid is boiled e length of time in water, it becomes insoluble in am- and, when added to potash or alcohol, a blackish brown ce remains undissolved, which is probably humin. Its ition has not been determined with certainty.

us. [Arable Land, P. C.]

scyama, the active and alkaline principle of the *Hyos- niger* and other varieties of henbane, from which it is d by a very complex and tedious process.

properties of hyoscyama are:—It crystallizes in stel- roups, which have a silky lustre; and it is often ob- in the state of a colourless, viscid, adhesive mass. perfectly dry, it is inodorous; but when moist, espe- impure, it has a disagreeable stupefying smell, re- g that of tobacco. When anhydrous, hyoscyama has lkaline reaction; but when mixed with water it has, contrary, very permanently alkaline properties. It is tile at common temperatures, and undergoes no change sure to the air; it melts at a low temperature, flowing like oil, and is volatilized at a high temperature; a large portion of it is then decomposed, becoming carbonized and yielding ammoniacal vapour. It is also partly volatilized by the vapour of boiling water, and communicates to the distilled water all the properties of narcotic poisons. It is readily soluble in water, and iodine added to the solution gives a kermes-coloured precipitate; tincture of galls gives a white precipitate; chloride of gold precipitates whitish flocculi; solution of platina gives no precipitate whatever. It dissolves also in alcohol and in æther.

Hyoscyama burns with a sooty flame; concentrated nitric acid dissolves it without acquiring colour, and sulphuric acid renders it brown.

Hyoscyama exists in combination with an acid; it neutralizes acids perfectly, and its power of saturation is great; the salts which it forms by direct combination with dilute acids mostly crystallize, are inodorous, but have an acrid, nauseous taste, are unalterable in the air, and are extremely poisonous.

Hyoscyama is a narcotic poison, like narcotina, and proves fatal as quickly as conia.

Ilicin, a neutral crystalline vegetable principle, obtained by precipitating a decoction of holly-leaves (*Ilex aquifolium*) by di-acetate of lead, evaporating the filtered liquor, and treating the residue with boiling absolute alcohol; by spontaneous evaporation there are produced transparent brownish-yellow crystals, which are bitter, and readily soluble in water, but not in æther. The solution is not precipitated by metallic oxides. This substance has been recommended as a powerful remedy in dropsy and intermittents.

Imperatorin, a neutral crystalline vegetable product, procured from the root of the *Imperatoria Ostruthium:* it is obtained by exhausting the root with æther, distilling the greater part of it, and submitting the remainder to spontaneous evaporation, by which the imperatorin is obtained crystallized in prisms, which are colourless, transparent, inodorous, styptic, and acrid; they do not alter vegetable colours; they melt when heated to 167°, and concrete into a radiated mass, the density of which is 1·192. At a high temperature imperatorin is decomposed, diffusing an acrid vapour. It is insoluble in water, but soluble in alcohol, æther, olive oil, and oil of turpentine; when dissolved in a solution of potash, it is precipitated from it by acids, unchanged. Sulphuric acid dissolves imperatorin, and assumes a brownish red colour; in nitric acid it dissolves with a yellow tint: these solutions are both decomposed by water. Iodine forms with it a brownish red compound, which yields iodine when heated. Its composition is represented by $C^{24} H^{12} O^{5}$.

Indin is prepared by the action of potash on sulphesathyde, a brown-red powder, consisting of carbon, sulphur, hydrogen, and azote; this is to be triturated in a mortar with a concentrated solution of potash, and by their action and subsequent very complicated operations indin is obtained, possessing the following properties:—It is pulverulent, of a very fine deep rose-red colour, insoluble in water, and slightly soluble in alcohol and æther. When heated, it begins to swell as soon as it melts. It yields a substance which crystallizes in needles, and much charcoal remains. Boiling nitric acid decomposes it, altering its colour very slightly, and red vapours are formed. If the ebullition be continued, the new product is also decomposed and disappears. Sulphuric acid dissolves it, assuming a red colour, and water precipitates it from solution unaltered; bromine colours it violet. Ammonia has no action on indin, but potash attacks it under certain circumstances. It is isomeric with white indigo, and its composition is represented by $C^{16} H^{6} NO^{2}$.

Indinic Acid is formed in combination with potash, yielding black crystals, by the action of the alkali upon indin; the indinate of potash is readily decomposed by water, and still more easily by acids; alcohol dissolves a little of it, but by long washing decomposes it. In the air it becomes of a light rose-colour. Indinic acid is probably similar in composition to isatic acid $= C^{16} H^{6} NO^{5}$.

Inulin, a neutral vegetable principle, resembling starch in many of its properties; it exists in the root of elecampane (*inula helenium*), the *helianthus tuberosus*, the *dahlia*, and some other plants. The roots are reduced to a pulp, which is to be placed on a very fine sieve, and a stream of water is to be poured upon it as long as it is rendered milky; the inulin is then allowed to deposit; the supernatant liquor being poured off, the deposit is to be repeatedly washed with water till it comes off perfectly limpid.

Inulin when dry has the following properties:—It is a white brittle mass composed of crystalline grains, or else a fine and white powder, which adheres to the teeth. It is insipid, insoluble in cold water, but very soluble in boiling water; the solution is fluid, and not gelatinous like that of starch. When it is very dilute, it does not become turbid on cooling; but alcohol, not being a solvent of inulin, precipitates it from this solution. When heated to above 212°, it melts, and is converted into a sweetish mass which is very soluble in cold water (*pyro-inulin*). Cold sulphuric or nitric acid converts it into the same substance.

Iodine renders inulin of a brown tint, which is fugitive. Lime-water, solution of tin, subacetate of lead, tincture of galls, protosalts of mercury, and salts of silver, do not precipitate the solution of inulin; the alkalis act upon it as they do on starch.

Dilute boiling sulphuric acid converts inulin rapidly into glucose; this effect is also produced when inulin is heated alone: the glucose produced undergoes the spontaneous fermentation when mixed with yest. According to Parnell, its composition is represented by $C^{24} H^{21} O^{21}$, when dried at 212°.

IODOFORM is a compound of 2 equivalents of carbon, 1 of hydrogen, and 3 of iodine. Its formula is C^2HI^3. It is prepared by adding an alcoholic solution of potash to one of iodine, till the colour of the latter is destroyed; care must be taken to avoid any excess of the alkali; the alcohol is evaporated at a gentle heat, and as it goes off crystals of iodoform are deposited, which are to be washed with pure water to separate the iodide of potassium.

The properties of iodoform are:—It has the form of yellow brilliant laminæ, which have a slight disagreeable odour, somewhat resembling that of saffron; it is insoluble in water, but very soluble in alcohol, æther, and pyroxylic spirit. It sublimes at 212°, and decomposes at 248° into carbon, iodine, and hydriodic acid. Its alcoholic solution decomposes very readily.

ISATIC ACID. Isatin dissolves in potash with a deep purple colour, which becomes bright yellow by heat. The solution yields by evaporation a crystalline salt of potash, which is soluble in alcohol, and crystallizes in small, hard, colourless prisms. When a solution of this salt is mixed with one of acetate of lead, a white precipitate is obtained, which, diffused in water and decomposed by hydrosulphuric acid, yields a colourless acid liquid, and this by spontaneous evaporation yields a white and scarcely crystalline powder, which is hydrated isatic acid.

The properties of isatic acid are:—It is perfectly insoluble in cold water, but when heated in water it is decomposed into isatin and water, the mixture becoming of a reddish yellow colour: the soluble isatates act in the same manner with the mineral acids; when they are added to it cold, no decomposition is apparent; but as soon as heat is applied, the mixture becomes yellow, and deposits crystals of isatin.

Isatate of potash gives a white precipitate with barytic salts, soluble in boiling water; with the salts of silver it gives a white precipitate, which dissolves when heated in the mixture, a certain portion of the silver salt being reduced to the metallic state; the boiling solution of isatate of silver deposits crystals which are partly in laminæ and partly granular. Its formula is $C^{16} NH^7 O^5$, HO.

ISATIN, a substance obtained from indigo by the addition of two equivalents of oxygen. In order to prepare it, powdered indigo is to be mixed in water with equal parts of sulphuric acid and bi-chromate of potash, the last being dissolved in 20 or 30 parts of water. The indigo dissolves, and at first without the extrication of any gaseous matter, but towards the end with the disengagement of carbonic acid gas, and the formation of a deep yellowish brown liquid, from which the isatin separates by evaporation, in crystals; these are purified by repeated crystallizations in water, and one and the last in alcohol.

The properties of isatin are:—It crystallizes in prisms, which are of a yellowish red or deep aurora-red colour, possessing much splendour when deposited from an alcoholic solution; they are slightly soluble in cold water, but dissolve readily in boiling water and in alcohol: these solutions discolour the skin, and impart a disagreeable odour to it. The crystals are decomposed by heat, leaving a charcoal which it is difficult to incinerate; the caustic alkalis convert it into isatic acid. Its formula is $C^{16}NH^5O^4$.

ITACONIC ACID. When citric or aconitic acid is distilled, two liquids are obtained in the receiver, the lighter of which mixes perfectly with water, whilst the heavier, which is oleaginous, combines with it slowly, and becomes a crystalline mass, to which a sufficient quantity of boiling water is to be added to dissolve the oleaginous liquid and the crystals formed, and the solution is to remain exposed to the air; after some days' spontaneous evaporation, crystals of i
are deposited, which are transparent and hard; t
be purified by repeated crystallizations from water

The properties of the itaconic acid thus prepa
It crystallizes in rhombic tables or rhombic octoh
has no smell, but possesses a very strong acid tast
solves in 17 parts of water at 50°, and in 10 parts
boiling water dissolves much more. It is soluble
and in æther; at 248° the crystals lose no weight.
they melt, exhaling white irritating vapours, an
without leaving any residue when the heat is
When subjected to distillation they decompose into
citraconic acid and water. The formula of this
$H^2 O^3$, HO.

JERVINA, a vegetable alkali found with veratria a
lina in white hellebore root. It is white and crys
melts when heated into an oleaginous liquid; a
temperature it takes fire, and burns with a sooty f
out any residue. It is nearly insoluble in water, b
in alcohol.

It compounds with hydrochloric, sulphuric, and n
are but slightly soluble in water and acids; the s
solves readily in water; ammonia decomposes th
and occasions a bulky precipitate of jervina. Ac
Will its composition is represented by $C^{60} H^{43} N^{2}$

LANTHANIUM. A new metal discovered by M
what had been previously supposed to be entirel
cerium: it is prepared by calcining the mixed
cerium and lanthanium; by this the oxide of cerium
insoluble in dilute acids, and the oxide of lanthani
is a powerful base, may be extracted by nitric ac
with 100 parts of water; when an alkaline carbonat
to the nitrate of lanthanium, the carbonate of th
precipitated. Oxide of lanthanium is not reduced t
of metal by potassium, but it separates a grey metal
from the chloride of lanthanium, which oxidizes in
the evolution of hydrogen gas, and is converted int
hydrate.

Oxide of lanthanium, in the purest state in wh
hitherto been obtained, is nearly white or of a lig
colour without any admixture of brown, or brownish
is every reason to believe that the colour is owin
impurity, from which it has not been hitherto possi
it. It undergoes no alteration by calcination at a r
close vessels; it restores the blue colour of redden
paper; when sprinkled with water, it is gradually
into a hydrate, and becomes a bulky white pow
alteration occurs very rapidly in boiling water; it
very readily in acids, even when dilute; when b
solution of hydrochlorate of ammonia, it expels am
an ammonio-chloride of lanthanium is formed; th
lent of lanthanium is about 48; hydrate and car
lanthanium are both insoluble in carbonate of ammo

Lanthanium seems to combine with oxygen
proportion only; it dissolves in hydrochloric aci
evolving chlorine; it appears to be composed of
lent of oxygen 8 + 1 equivalent of lanthanium 48 =

Chloride of Lanthanium. When a solution of
lanthanium in hydrochloric acid is evaporated over
acid, prismatic crystals of chloride of lanthanium
colour are obtained; it deliquesces on exposure t
readily dissolves in alcohol, to the flame of which i
no colour. This salt melts in water of crystallizat
off hydrochloric acid, and leaves a mixture of chl
oxichloride of lanthanium. It appears to be compo
equivalent of chlorine 36 + 1 equivalent of lanth
= 84.

Nitrate of Lanthanium is obtained by dissolving
in nitric acid. It crystallizes with difficulty, and for
coloured saline mass which is deliquescent and
alcohol; the form of the crystal appears to be an oc
and it contains no water of crystallization. It con
equivalent each of acid and base, or 54 + 56 = 110.

Carbonate of Lanthanium. The neutral compou
tained by precipitating the soluble salts of lanthan
carbonate of soda. It is a white flocculent precipita
on drying becomes a white adherent powder.

It is composed of 1 equivalent of acid 22 + 1 e
of oxide 56 = 78. It has been found by Mos
a mineral, which was supposed to be a protocarb
cerium, contained only a trace of this metal, and
almost entirely of a compound of 1 equivalent of carb
with 3 equivalents of oxide of lanthanium.

ate of Lanthanium. Dilute sulphuric acid very
lissolves the oxide; by evaporation, acicular radiating
ine-coloured crystals are obtained. This salt gives off
ut does not melt at a low red heat; when anhydrous,
ts of nearly 1 equivalent of sulphuric acid 40 +
lent of oxide 56 = 96.

alts of lanthanium give white precipitates with phos-
d oxalic acids and ferrocyanide of potassium, but
ydrosulphuric acid nor tincture of galls produces any

ARAMIDE. When ammoniacal soap, prepared either
mal fat or olive oil, is treated with boiling water, the
ses through it without being dissolved; on cooling
ter part solidifies on the surface, which, if dis-
boiling alcohol, deposits on cooling a substance
hen purified, has the following properties: it is white,
e, perfectly neutral, insoluble in water, very soluble
l and in æther, especially when hot. It melts at
0° Fahrenheit, and it burns with a sooty flame.

olutions of potash and soda decompose it, when
ted and boiling, ammonia being expelled and soap
Acids act upon it only when somewhat concentrated,
readily when hot than cold. Its formula is C^{34} H^{35}
t is equivalent to margarate of ammonia less 1 equi-
water.

LLIN. A name given by John to the pith of the
er it has been treated with water and with alcohol.
luble in water, alcohol, æther, oils, or dilute alkaline
; concentrated sulphuric acid carbonizes it; nitric
erts it into oxalic acid.

M. A compound substance discovered by Liebig.
be prepared by simply heating sulphocyanide of
m, or a mixture of sulphocyanide of potassium and sal
c; by their action there are produced three volatile
and a solid substance; the three first are ammonia,
ted hydrogen, and sulphuret of carbon; the solid
mixture of melam and chloride of potassium, which
separated by washing with water.

properties of melam are:—It is a non-crystalline
f a greyish white colour, and is insoluble in water,
or æther; a boiling solution of potash dissolves and
y decomposes it; boiling and concentrated nitric and
acid dissolve it, and the solutions, when treated
hol, produce a precipitate of ammelide; when the
tions are boiled for some hours, the melam is con-
to ammonia and cyanuric acid.

e action of heat melam is converted into ammonia
on: hydrochloric and dilute nitric acid convert it into
and melamine: and when fused with hydrate of
mmoniacal gas and cyanate of potash are produced.
la is C^{12} H^{9} N^{11}, or 72 carbon, 9 hydrogen, and
= 235.

MINE. One of the simplest processes for preparing
is to boil melam until it dissolves in a moderately
lution of potash; when the liquor has been concen-
d cools, melamine separates in crystals, and by re-
ation it is obtained in a pure state.

roperties are:—It crystallizes in rhombic octo-
which are transparent and colourless, or only slightly
It is very slightly soluble in cold water, but more
ling water. It is insoluble in alcohol or in æther,
alterable in the air; the aqueous solution has a bitter
d has no action on vegetable colours. When dry
is heated, it fuses, and sublimes almost entirely
decomposing; but a small portion is converted into
nd ammonia.

ntrated sulphuric acid and nitric acid decompose it,
ated, into ammonia and ammelide or ammeline. When
th hydrate of potash, there are produced ammonia and
of potash.

nbines with dilute acids to form salts, all of which
acid reaction except the double basic salts. The ni-
osphate, and oxalate are less soluble than the mela-
elf; but the acetate and formiate are very soluble.
e precipitates a part of magnesia from solution, and
double salt with that which remains dissolved.
he most azotized body known. Its formula is C^{6} H^{6} N^{6}.

ITIC ACID. [MELLITE, P. C.]

XALIC ACID. When a saturated solution of alloxanate
es or strontia is heated to ebullition, a precipitate is
which consists of a mixture of mesoxalate, alloxanate,
onate of the base employed. On evaporating the
olution crystalline crusts are formed composed of urea and mesoxalate of barytes. When these are digested in alcohol the urea is dissolved, and the mesoxalate of barytes is unacted upon. If a solution of alloxane is gradually added to a boiling one of acetate of lead, a heavy granular precipitate of mesoxalate of lead is formed, and there remains in the acid liquor merely the excess of acetate of lead and pure urea. The mesoxalic acid is obtained by treating the mesoxalate of lead or barytes with dilute sulphuric acid.

The properties of the solution thus obtained are, that it is very acid, reddens vegetable colours, crystallizes, and produces, when saturated with ammonia, as alloxanic acid does, white precipitates in the salts of lead, lime, barytes, and strontia. These precipitates are soluble in acids and in a large quantity of water. A solution of mesoxalic acid may be boiled and evaporated without decomposing.

The distinguishing character of this acid is the mode in which it acts on the salts of silver. When a salt of silver is added to mesoxalate of ammonia, a yellow precipitate is formed, which becomes black, and is reduced with effervescence when the mixture is gently heated.

The formula of this acid is C^{6} HO^{9}.

METACETONE. When a mixture of 1 part of sugar and 8 parts of lime is submitted to distillation, the temperature, after reaching 284° Fahrenheit, rapidly rises, and a very small quantity of combustible gas is liberated, accompanied with a liquor which is a mixture of acetone and metacetone. When water is added the metacetone separates, which is to be rectified, the last portions of the product being preserved.

Metacetone is a colourless liquid of an agreeable odour. It boils at about 153° Fahrenheit; does not mix with water, but combines with alcohol and æther. It may be regarded as acetone minus an equivalent of water. Its formula is C^{6} H^{5} O.

METHYL, the hypothetical radicle of pyroxylic spirit [PYROXYLIC SPIRIT, P. C.], is composed of 2 equivalents of carbon 12 + 3 equivalents of hydrogen. Its composition was formerly supposed to be 1 equivalent of carbon and 2 equivalents of hydrogen. Its formula is C^{2} H^{3}.

Oxide of Methyl, Methylic Æther, is a compound of this base (or at any rate of the proportions of carbon and hydrogen assigned to it) and 1 equivalent of oxygen. Its formula is C^{2} H^{3} O. It is prepared by distilling a mixture of equal volumes of concentrated sulphuric acid and pyroxylic spirit. The gases which are evolved are passed first through cream of lime, and afterwards into several bottles containing pure water, which absorbs the oxide of methyl. When the aqueous solution is moderately heated, it parts with the oxide of methyl, which is collected over mercury. The gas is deprived of humidity and of hydrated oxide of methyl, by leaving it in contact with potash.

The properties of oxide of methyl are:—It is a colourless gas, with a very agreeable æthereal odour. It burns with a blue flame; does not liquefy at 5° Fahrenheit; dissolves in water, giving it a sharp taste and an æthereal smell; 1 volume of water dissolves 37 volumes of the gas. It dissolves in alcohol in much larger quantity, as also in hydrate oxide of methyl (pyroxylic spirit), and concentrated sulphuric acid, to which, when water is added, it gives out the gas.

When gaseous oxide of methyl is introduced into a cooled receiver with the vapour of anhydrous sulphuric acid, these two substances combine and form neutral sulphate of oxide of methyl; and in combining with the oxacids it forms either neutral or acid salts. It contains the same elements combined in the same relative proportions as alcohol. The density of this gas is 1·605.

When oxide of methyl is combined with an equivalent of water it forms hydrated oxide of methyl, or pyroxylic spirit.

Chlorine, iodine, sulphur, and cyanogen, all form compounds with methyl.

MUCIC ACID, *Saclactic Acid.* This acid is formed by the action of dilute nitric acid upon gum arabic, or sugar of milk, and some other bodies. One equivalent of crystallized sugar of milk is converted into 2 equivalents of crystallized mucic acid, by combining with 12 equivalents of oxygen and losing 2 equivalents of water.

Mucic acid is a white crystalline powder, which is gritty between the teeth: its taste is weakly sour. It dissolves in 6 parts of boiling water, and the solution reddens litmus-paper. It is insoluble in alcohol, and dissolves very sparingly in dilute acids; it dissolves in concentrated sulphuric acid, imparting a crimson colour to it. When the mixture is heated, charcoal is developed. When submitted to dry distillation it blackens, and pyromucic acid and other products are obtained.

It is composed of 6 equivalents carbon, 5 equivalents hydrogen, 8 equivalents oxygen = 105. Its formula is $C^6 H^5 O^8$.

The alkaline mucates are soluble in water, whereas those which contain an alkaline earth, or a metallic oxide, are insoluble. These salts are all decomposed by the mineral acids, they combine with the basis and set the mucic acid free.

Mudarin. The name given by Dr. Duncan to a peculiar principle obtained from the bark of the root of the *Calotropis Mudarii*, and to which he attributes its emetic effects. It is procured in the state of a brown, transparent, extractiform mass, by evaporating the alcoholic tincture of the bark. It is very soluble in water and in alcohol, but insoluble in æther, oil of turpentine, and fixed oils. Its aqueous solution gelatinizes at 95° Fahrenheit, coagulates at a higher temperature, and separates into a porous substance, which, when once cooled, does not redissolve for some days.

Murexan, *Purpuric Acid* of Dr. Prout. To prepare this substance, murexide is to be dissolved in potash with the assistance of heat, which is to be continued until the blue colour has disappeared, and then an excess of dilute sulphuric acid is to be added.

Its properties are:—It crystallizes in very brilliant silky scales of a yellowish colour, which are insoluble in water and dilute acids. It dissolves cold in solution of ammonia, and the other alkalis, without neutralizing them. The ammoniacal solution becomes purple by exposure to the air, and deposits brilliant crystals of murexide.

It is composed of 6 equivalents carbon, 2 equivalents azote, 4 equivalents hydrogen, and 5 equivalents oxygen = 108. Its formula is $C^6 N^2 H^4 O^5$.

Murexide, *Purpurate of Ammonia* of Dr. Prout. This substance may be obtained by several processes. The least operose is probably that of dissolving uric acid in dilute nitric acid, evaporating the solution till it assumes a reddish colour; after the liquor has cooled to 158° Fahrenheit, add excess of ammonia; then dilute it with half its volume of boiling water, and allow it to cool. Care must be taken not to employ too much or too little nitric acid. Whilst ammonia continues to give a red precipitate, when added to small portions, the nitric acid is insufficient. If, on the contrary, ammonia produces a glairy yellow precipitate, murexide cannot be obtained without passing a current of hydrosulphuric acid into the liquor.

The properties of murexide are:—It crystallizes in short four-sided prisms, which exhibit a green metallic reflection. They are garnet-red by transmitted light. Murexide is very little soluble in cold water, and gives it a magnificent purplish red colour. It dissolves readily in water at 158°, and crystallizes from the solution unaltered. It is insoluble in alcohol and in æther. It is insoluble also in solution of carbonate of ammonia, but dissolves in a solution of potash, producing a superb indigo-blue colour, which disappears by heat, with the evolution of ammonia. It contains 12 equivalents carbon, 6 equivalents hydrogen, 5 equivalents azote, 8 equivalents oxygen = 212. Its formula is $C^{12} H^6 N^5 O^8$.

Naphtha. [Hydrogen—*Carburets*, P. C.]

Niobium, a metal lately discovered in the tantalate of Bavaria by H. Rose. When perchloride of niobium is submitted to the action of dry ammonia it becomes yellow, with considerable evolution of heat, and when this is heated it becomes black, with the disengagement of hydrochlorate of ammonia. On washing it with water, to free it entirely from this salt, the water passes clear as long as it contains any of it; but when the metal is nearly pure the water becomes turbid. When niobium is heated in the air it burns with the evolution of light, and becomes white niobic acid. Nitric acid and aqua regia, even when boiling, do not act upon niobium; but it is acted upon by a mixture of nitric and hydrofluoric acids, and a red vapour is formed during the action.

Niobic acid readily combines with the alkalis; and when fused with alkaline carbonates, carbonic acid is expelled. These compounds are soluble in water. Acids precipitate niobic acid from these salts.

Infusion of galls, added to a solution of niobate of soda, produces a deep orange-yellow precipitate. Ferrocyanide of potassium produces a similar effect, and the red ferrocyanide gives a deep yellow precipitate. When a plate of zinc is put into a solution of niobate of soda, a blue precipitate is formed, which in course of time becomes brown.

Opiammon, a substance produced by the decomposition of opianate of ammonia. This salt is to be evaporated to dryness with a gentle heat, by which a substance separates after washing with water, which is opiammon, and is rende
by boiling in water.

Its properties are:—It is a powdery substance
yellow colour, which is probably derived from som
substance: viewed under the microscope it appears
of a collection of small transparent crystals. It fuse
and at a high temperature it emits a yellow smoke w
the same odour as opianic acid. It is insoluble in co
and boiling water dissolves but little of it, and this is
a change which it undergoes. The solution is of a
low colour, and has an acid reaction. It dissolves
boiling alcohol, which on cooling deposits crystals of
mon and opianic acid. Concentrated sulphuric acid
it, and is rendered of an orange colour. Water ren
solution milky; but when it is heated its transpa
restored, and afterwards it deposits, on cooling, cr
opianic acid, and retains in solution an ammoniacal sal
ammon dissolves in ammonia, and produces opianate
monia.

It appears to be composed of $C^{40} H^{17} N O^{16}$, or
parts, of carbon, 60·168; hydrogen, 4·248; azote,
oxygen, 32·039. M. Wohler states that opiammon
the properties of bodies described as *amides*.

Opianic Acid is obtained by the action of an
dilute sulphuric acid upon narcotina, with the ad
small portions of binoxide of manganese in fine pow
heating the mixture to ebullition. The liquor beco
pale yellow colour, and yields a little carbonic acid.
of the oxide of manganese is to be added, and care
taken to have sulphuric acid also in excess.

On the cooling of the reddish yellow liquor, smal
lated yellow crystals are obtained, which are opia
To render them colourless they are to be twice was
cold water, and then dissolved in a boiling solution
chlorite of soda, with the addition of hydrochloric
excess. The liquor, after filtration and cooling,
colourless crystals of opianic acid.

The crystals of this substance are colourless, ve
reticulated laminæ, inodorous, slightly bitter, redde
paper feebly: they melt at 284° Fahrenheit witho
water. When heated in a retort they rise up the
without being properly volatilized, and the properti
acid are altered. When heated in atmospheric air,
volatilizes with an odour resembling that of vanill
burns with a bright flame. It is very slightly solubl
water; but it dissolves in boiling water in so large
that the solution solidifies on cooling.

It combines with various bases to form salts, of whi
are soluble and crystalline; such are those of ammonia,
lead, and silver.

It appears to consist very nearly of $C^{20} H^9 O^{10}$ =
in 100 parts, of carbon, 57·460; hydrogen, 4·295;
37·245.

Oxygen. With respect to the density of oxygen
to be observed that the experiments performed
Dumas and Boussingault gave 1·10566 as its specific
agreeing as nearly as possible with the previous de
tion of Saussure, and exceeding by 0·0026 only the
according to Berzelius and Dulong. M. Wrede
results to be 1·1052.

M. Dumas adopts 8 as the equivalent of oxygen,
hydrogen being 1; and he admits 9 as the number r
ing water, and 14 for azote; all of which are those p
proposed by Dr. Prout, and adopted in this work.

Mr. Balmain has proposed a new process for
oxygen gas, which may be advantageously employed
occasions, and more especially on the lecture-table,
ing a ready means of procuring the gas. It consists
ing in a glass retort, by means of a spirit-lamp, a mi
4 parts of concentrated sulphuric acid and 3 parts of
mate of potash. The quantity obtained is large,
nearly or quite pure; the oxygen is of course deri
the reduction of the chromic acid to the state of
chromium, which remains combined with the sulph
and potash; and from this, with proper treatment,
supply of bichromate of potash may be obtained
operations.

Paranaphthalin, Anthracin, a substance
among the products obtained by the distillation of
is white, crystalline, but less brilliant than naphtha
melts at 356°, distils at 392°, and sublimes at a low
perature in crystalline leaves. It is insoluble in
slightly soluble in boiling alcohol and in æther. It

Quinoidina, the name given by Sertuerner to a third alkali, contained in yellow red and bark. Its properties are, that it is a brownish, resinous, diaphanous, lamellated mass, having the appearance of colophony. It is inodorous, and is bitter like quina; it is not volatile, fuses when heated, and burns in the air without leaving any residue; it is nearly insoluble in cold water, and fuses in hot: the solution possesses nearly the same chemical reactions as that of quina; it is very soluble in alcohol; æther renders the alcoholic solution turbid, and precipitates brown flocculi from it.

It neutralizes acids perfectly, and yields with them brown, viscid, bitter, uncrystallizable compounds, which are very soluble in alcohol; its capacity of saturation appears to be greater than that of cinchonia or quina.

Quinöil, a neutral substance, obtained when kinic acid is decomposed by heat, or better by gently heating in a retort one part of crystallized kinic acid, four parts of binoxide of manganese, and one part each of sulphuric acid and water. The mixture swells considerably, and the thick vapours arising condense in the receiver in the form of yellow needles, and an acid liquor is produced, containing formic acid; the crystals are to be purified between folds of blotting-paper, and again sublimed.

The properties of quinoil are:—It is of a golden yellow colour, possesses great lustre, and is heavier than water; it volatilizes without decomposition, and melts at 212°. Its vapour is penetrating, and causes the eyes to water; it is slightly soluble in cold water, but alcohol and æther dissolve it readily.

The caustic alkalis alter it, and give a brown-coloured solution with it, which leaves, by evaporation, a black mass, which dissolves in water, and gives brown precipitates with acids and metallic salts. Concentrated sulphuric acid carbonizes quinöil, and when diluted converts it into brown insoluble flocculi. Nitric acid and hydrochloric acid dissolve it with a yellow tint. Its aqueous solution is not precipitated by the salts of silver or copper; the diacetate of lead forms with it when hot a bright yellow gelatinous mass; gaseous chlorine yields with it a crystalline compound, which is soluble, and of a pale yellow colour. When quinöil is treated with ammoniacal gas, it becomes of an emerald colour.

Quinolein, an alkali obtained by heating quina, or, which is better, conchonia, with potash; by this the quina loses the elements of carbonic acid, which combine with a portion of the potash; by distillation, colourless or slightly yellow oleaginous drops mixed with water are obtained; they are heavier than water, and dissolve in it to some extent; but they are more soluble in alcohol and in æther. The taste of quinolein is very acrid and bitter: its odour is strong, resembling that of St. Ignatius's bean. It has a strong alkaline reaction, neutralizing acids very perfectly, and precipitating certain metallic solutions. The salts of quinolein are crystallizable and soluble in water; the sulphate crystallizes in radiating silky crystals. Its composition is represented by $C^{38} H^{20} N^{2}$.

Roccellic Acid, obtained from the *Roccella tinctoria*. This acid crystallizes in fine colourless needles of a silky lustre. It is insoluble in water, whether cold or hot; alcohol dissolves it readily, 100 parts of 0·819 density, at the boiling-point, taking up 55 parts. Æther also dissolves it easily: it melts at 266°, and solidifies at 251°.

The alkaline roccellates dissolve in water, and yield solutions which froth like soap; but when concentrated, the solutions cannot be drawn out in threads like those of other soaps. Roccellate of potash crystallizes in small laminæ; the salt of lime is a white precipitate, insoluble in water, and contains 15·9 per cent. of base.

Its probable formula is $C^{17} H^{11} O^{4}$ when in crystals.

Sabadillina, an alkali contained in the different kinds of hellebore. It is obtained in the form of reddish stellated hexagonal prisms; but when quite pure it is colourless; its taste is extremely acrid; at 392° it fuses into a resinous mass, and loses 9·53 per cent. of water: at a high temperature it is decomposed. It is soluble in boiling water, but dissolves very sparingly in cold water: it is insoluble in æther. It possesses a strong alkaline reaction, and forms with acids salts which are generally crystallizable; by the concentrated acids it is decomposed; 100 parts of sabadillina saturate 19 parts of sulphuric acid. It has not yet been analyzed.

Saccharic Acid, Oxalhydric Acid, is formed by the action of dilute nitric acid on common or on grape sugar. When the solution is much evaporated it deposits crystals after long standing.

The properties of this acid are:—It forms whit lent precipitates in lime and barytes water, soluble i of acid. It does not precipitate the salts of lime or nitrate of silver is not precipitated by it, but when am added to the mixture, a white precipitate is formed, reduced to the metallic state by exposure to the sligh Nitric acid when hot converts saccharic acid into o carbonic acids; the alkalis dissolved in water with it a brown colour, when in excess and exposed to heat; dissolves in all proportions in alcohol, and but slightly i it dissolves zinc and iron with the evolution of hydrog Formula $C^{12} H^{5} O^{11}+5\,HO$.

Sacchulmic Acid and Sacchulmin.—When can boiled for a long time in sulphuric acid diluted wi thirty parts of water, or with very dilute nitric or hydr acid, *sacchulmin* is deposited in brown, brilliant, cr scales, contaminated with *sacchulmic acid;* the latter i dissolved by ammonia, in which the former is insolubl

The properties of sacchulmic acid are:—It is by ammonia and the alkalis, and is precipitated from acids in brown flocculi; these when dry become brown powder, insoluble in alcohol and in æther; ebullition in water it is converted into sacchulmin, and solubility in ammonia, but without undergoing any c its composition. Its ultimate analysis leads to the $C^{2} H^{2} O=22$, as its composition; but its saturating p dicates fifteen times this number as its equivalent.

Salicin. The composition of this substance is more correctly represented by $C^{42} H^{23} O^{16}+6HO$, th have formerly stated it. [Salicin, P. C.]

Saliculous Acid. When a mixture of one part o one of bichromate of potash, two and a half of sulph and twenty of water are made to act on each other in the result is the formation of saliculous acid. The sal be dissolved in one part of the water, and the sulph diluted with the remainder. Heat and effervescence duced, and when these cease distillation commences; comes over with the vapour of water, and after some t separate: the acid is to be purified by washing wi and rectifying from chloride of calcium.

The properties of saliculous acid are:—It is an o liquid, colourless or slightly yellow; inflammable, a with a sooty flame; specific gravity 1·1731, boils 354° F., becomes solid at 5° below zero; its taste is its smell aromatic and agreeable. Water dissolves readily, and the solution, at first green, reddens ti litmus, and eventually destroys the colour.

Concentrated sulphuric acid decomposes saliculo chlorine and bromine take an equivalent of hydrogen and hydrochloric or hydrobromic acids are form evolved; the chlorine or bromine, replacing the h form chlorosaliculic or bromosaliculic acid.

Saliculous acid is also obtained when the flowers *Spiræa ulmaria*, or meadow-sweet, are submitted to tion. Its formula is $C^{14} H^{6} O^{4}$ or $C^{14} H^{5} O^{3}+HO$.

This acid combines with bases to form salts, in wh it loses an equivalent of oxygen and hydrogen in the water, which is replaced by the combining base.

Saliculic Acid is obtained by heating saliculous a potash; the mixture is of a faint brown colour, and must be continued till it becomes colourless. During thi hydrogen is evolved; the residue is to be dissolved and treated with excess of hydrochloric acid, this tates the saliculic acid, which is to be purified by solutions and crystallizations.

The properties of this acid are:—It crystalli solution in hot water in small tufts, and by sublimat obtained in long needles; it is but slightly soluble water, but very readily dissolved by hot water and by It reddens litmus-paper, and decomposes the alkal bonates. It is decomposed by hot sulphuric acid, development of charcoal, and the evolution of sulphur gas. Its formula is $C^{14} H^{5} O^{5}+HO$.

The salts which it forms have been but little exami

Saliculimide. When ammonia is added drop by saliculous acid dissolved in alcohol, the liquor become composed of very fine yellow needles; when moderatel the crystals redissolve, and on standing the solution brilliant transparent prisms of a golden-yellow colour when dry are hard and reducible to powder, and are in water, whether cold or boiling.

When submitted to dry distillation saliculimide is posed, leaving a coaly residue; acids and alkalis co nation. Hence arose his 'Examen Concilii Tridentini' (4 vols. Leipzig, 1565, 8vo.). The best edition is that of Frankfort, 1707, folio), a work full of historical information, and of solid refutation of the Roman Catholic doctrines, which has not been surpassed by any subsequent writer against the Roman Catholics, and is still serviceable, in the opinion of Protestants, beyond other works of the kind, to prove the fallacy of the Papal system. The sound judgment, the clear and easy yet serious and impressive style, and the spirit and moderation manifested in his work, caused even the Roman Catholics to admire him: they used to say to the Protestants, '*Vos habuistis duos Martinos; si posterior non venisset, prior non stetisset.*' With equal approbation he defended Luther's doctrine of the Lord's Supper against the Calvinists in his 'Repetitio sanæ Doctrinæ de vera Præsentia Corporis et Sanguinis Domini in Cœna Sacra' (Leipzig, 1561). He also took a decided part in fixing the doctrines of the Protestant church. In conjunction with Mörlin, he compiled at Königsberg, in 1566, the 'Corpus Doctrinæ Prutenicæ,' which acquired great authority among the Protestants in Prussia. Having become superintendent of the diocese of Brunswick in 1567, he drew up a creed for the churches of Lower Saxony, which was adopted in 1571, at the Convention of Wolfenbüttel, and from 1573 he exerted himself, with Jacob Andrea, to induce the churches of Saxony and Suabia to adopt the 'Formula Concordiæ,' which was introduced in Upper and Lower Saxony, Suabia, and Franconia, as a rule of faith. He devoted himself almost exclusively to this work; took, with Andrea, a leading part in all the meetings that were held on the subject; and obtained the admiration of his contemporaries, as well by the prudence and firmness of his conduct as by the depth and extent of his knowledge. Having resigned his office in 1565, he died at Brunswick on the 8th of April, 1586. The 'Harmony of the Gospels,' which he had begun, was completed by Leyser and Joh. Gerhard.

Chemnitz was so highly esteemed by his contemporaries, that, after his settling at Brunswick, he received offers of important situations from Frederick, king of Denmark; from the electors Louis of the Palatinate, Augustus of Saxony, and John George of Brandenburg, likewise from Duke Albert of Prussia, and the Protestants in Austria, but he was satisfied with his situation, and declined them.

(Brockhaus, *Conversations-Lexicon; Die Kirchen Historie*, 2 vols. 4to. Jena, 1735.)

CHEQUE, an order on a banker by a person who has money in the bank, directing him to pay a certain sum of money to the bearer or to a person named in the cheque, which is signed by the drawer. Cheques are immediately payable on presentment. They are not liable to stamp-duty, and are therefore limited in their functions in order to prevent their circulating as bills of exchange. They must, for example, be payable on demand, without any days of grace; be drawn on a banker within fifteen miles of the place where they are issued; the place of issue must therefore be named, and they must bear date on the day of issue. A cheque should be presented on the day on which it is received, or within a reasonable time. One of the first rules to be observed in writing a cheque is to draw it in a business-like manner, so as to prevent a fraudulent alteration in the amount, for if otherwise the drawer may be liable. A 'crossed' cheque is an ordinary cheque with the name of a particular banker written across the face of it for security, or it may be crossed simply '& Co.'; and in these cases it will only be paid through that particular banker or some banker. If presented by any other person, it is not paid without further inquiry. The 'Bankers' Magazine' for Oct. and Nov. 1844, and Jan. and Feb. 1845, contains some valuable information on the Law of Cheques.

On of the great advantages of a banking account is the convenience of drawing cheques. A person is thus relieved of the necessity of keeping ready money in his hands, and a cheque is some evidence of payment in the absence of a proper receipt. The Bank of England allows cheques to be drawn for sums of 5*l.*, but a few years ago it allowed no cheques under 10*l.*

CHEREMISSES. [Russia, P. C.]

CHERLE'RIA, a genus of plants belonging to the natural order Caryophylleæ. It has 5 sepals, 5 petals (sometimes absent), 10 stamens, the outer ones opposite to the sepals springing from an oblong, emarginate, glandular base, 3 styles, a 3-valved capsule. There is only one species which is a native of Great Britain. It was called by Linnæus *C. sedoides*.

The petals are very generally wanting, the flowers
on short stalks. The stems are numerous, forming
mass close to the ground. The leaves are very
linear-subulate, and finely ciliated. It is found
mits of the mountains of Scotland.

(Babington, *Manual of British Botany*.)

CHERUBI'NI, MARIA-LUIGI-CARLO-
SALVADOR, was born in Florence, in 1760.
years of age he commenced the study of
the two Felicis, father and son, both of whom
transferred, first to Bizzari, and afterwards to
1773 he composed a mass and a motet, which
sensation in his native city; and during the five
years he produced many other works, both for
and the theatre, which met with decided
attracted the notice of the grand-duke
Tuscany, who in 1778 granted him a pension,
him to complete his studies under the
Bologna, with whom he passed nearly four years,
receiving much valuable instruction from that
also assisting him in filling up his scores, a practice
under such superintendence, his skill in this
position may, in great measure, be attributed.
was invited to London, where he continued two
composed his operas 'La Finta Principessa,'
Sabino,' in the latter of which the famous
made his débût at the King's Theatre. In 1786
quitted the British capital, and settled in that
which thenceforward became his adopted
scene of his greatest triumphs. He however
visited Italy, and in 1788 brought out his 'Ifigenia
at Turin. Returning to Paris in the same year,
the Académie Royale, his 'Demophoon.' The
'Lodoiska' was produced in 1791, at the
an event that forms an epoch in the annals of the
From this it was apparent that Cherubini meant to
that he was worthy to tread, in the footsteps of
Mozart. (*Dictionnaire Historique des Musiciens.*

'Lodoiska' was succeeded by 'Elisa,' 'Médée,'
Journées,' 'Anacreon,' and 'L'Hôtellerie
1805 Cherubini was invited to Vienna, and
out, at the Imperial Theatre, his 'Faniska.' His
became European, and in 1815 he was invited
by the Philharmonic Society, for which he
overture, a symphony, and a grand concerted vocal
of which were performed under his own direction
certs of that distinguished society, and certainly
pen of a master. But his Muse proving less
on this than on many former occasions, the effect
works was not commensurate with the labour he
on them, and with the anxiety he felt (to which
bear testimony) to justify the expectations which
to 'Anacreon'—as performed with marvellous
very first of the Philharmonic Concerts—had
his return to Paris, he found himself much
impolitic changes making by the restored dynasty in
as well as the other government establishments of
and retired from some of his situations in disgust;
soon recalled, and became composer of the Chapell
Professor of Composition at the Ecole Royale—of
1822 he was made Director,—a member of the
Royale des Beaux Arts, and Chevalier of the
neur. His last theatrical work was 'Ali Baba,'
produced in 1833, but, though received with
respect by the French public, it did not keep
stage. He died in March, 1842, and his
celebrated in a most solemn and distinguished
own fine 'Requiem,' the last composed of his
performed on the occasion.

In instrumental music Cherubini's fame has
out Europe. But it is in the field of sacred
genius expanded in its full dimensions. His
motets, &c. unite the most learned construction and
of the most original and sweetest melody. His
voix is a masterpiece, and of itself sufficient to
composer great and lasting reputation. Of his
works we only need mention his admirable finale
deux Journées,' of which M. Castil-Blaze has
turesque a description, and so laboured an
work on the French opera. The other
great artist are too numerous to be even named here

(*Harmonicon*, iii.)

CHETTLE, HENRY, whose name occurs very

e history of the old English drama, was a contemporary hakspere. We read the names of forty plays attributed im in whole or in part, the dates of which extend from ' to 1602; but his writing for the stage is inferred by Collier to have begun before 1592, when he published ne's 'Groatsworth of Wit.' He appears to have been nally a compositor. Four only of his plays have been ted, of which an account is given in Collier's 'History of natic Poetry;' and the same editor has inserted, in his pplementary Volume' to Dodsley's Collection, 'The Death obert, Earl of Huntington,' written by Chettle and An- y Munday.

HIEF-JUSTICE. [Courts, P. C.]

HILD, SIR JOSIAH, Bart., was an eminent London chant in the latter part of the seventeenth century, and of the ablest of our earlier English writers on commerce political economy. His principal publication is entitled f Observations concerning Trade and the Interest of y, by J. C.,' 4to., Lond. 1668. In his preface he tells t this tract was written at his country-house in the ness-year, that is in 1665. Its leading purpose is to de- f the late reduction of the legal rate of interest from 8 to r cent. (originally made by ordinance of the Long Parlia- t in 1651, and confirmed at the Restoration), and to urge l further reduction. The author's great example of com- ial success is that of the Dutch; and he maintains that lowness of the rate of interest is the *causa causans* of all ther causes of the riches of that people.' The rate of est, as is now well understood, is merely a measure or ssion of the ratio of the supply of money to the demand. ses or falls with the rate of profits: and that again de- s in great part upon the quantity of capital seeking for loyment: so that, in fact, instead of a low rate of interest g the cause of accumulated wealth in a community, it is likely to be the consequence of that state of things. was pointed out in an answer to Child's treatise, pub- d the same year under the title of 'Interest of Money ken, or a Treatise proving that the abatement of Interest e Effect and not the Cause of the Riches of a Nation.' In er respect also Child's notions in this publication are ed to those now generally entertained: his recommen- , namely, that the natural rate of interest should be down, or rather attempted to be kept down, by a legal ction. In support of his views he reprints, as an appen- Sir Thomas Culpeper's 'Tract against the High Rate of te,' first published in 1623. Notwithstanding some fun- ntal defects, however, the work contains much that is and valuable; and some of the principles laid down in both in advance of the current opinions of the day, and ly and happily expressed. A second edition, much en- d, appeared in 1690, under the title of 'A New Discourse de;' a third in 1698; and the work has since been twice ted, the last time in 12mo., at Glasgow, in 1751. It is in work that Child has explained his plan for the relief and loyment of the poor, of which Sir Frederic Eden has given ccount in his 'State of the Poor,' vol. i. pp. 186, &c. It ded the substitution of districts or unions for parishes, the compulsory transportation of paupers to the colonies. proposes that the funds should be managed by an incor- ted body, to be styled 'The Fathers of the Poor,' and to e, each of them, 'some honourable medal, after the man- f the familiars of the Inquisition in Spain.' In Watt's otheca, and other catalogues, this plan is noticed as a ate publication (though without date); but we do not that it ever appeared except as one of the chapters of 'New Discourse of Trade.' Child, who was one of the ctors, and for some time chairman, of the East India pany, and who took a leading part in the conduct of its eedings, is stated to have written several tracts in defence the trade to the East Indies; but they appear to have been nonymous, and the only one which has usually been dis- ly assigned to him is that entitled 'A Treatise wherein it monstrated that the East India Trade is the most national l Foreign Trades, by Φιλοπατρις,' 4to. Lond. 1681.' This rmed in the work called 'The British Merchant' (ori- lly published in 1710), second edition, vol. i. p. 162, to e been written by him, or at least by his direction. It contended by the opponents of the company, that the t India trade was ruinous, or prejudicial, by reason of its ing the country of gold and silver: it was answered by d, as it had been many years before by Thomas Mun, in s 'Discourse of Trade from England unto the East Indies,' t the trade in reality brought more treasure, or gold and silver, into the country than it took out of it, by our sales of Eastern commodities to other European nations. It was upon this ground, simply, that parliament had recently (by the 15 Car. II. c. 7, s. 12) so far permitted the trade to be legally carried on in the only way in which it could be carried on at all as to allow the exportation duty-free of *foreign* coin and bullion.

Taking his stand upon what has been called the mercantile system, the principle of which is, that the value of a foreign trade depends upon the balance which it leaves to be received in money, Child admitted the paramount importance of gold and silver, but contended that the effect of the India trade, taken in its whole extent, as including the trade with other countries which we carried on by means of our imports from the East, was to promote, not to prevent, the accumulation in our hands of the precious metals. The destruction however of the fancy that there was anything necessarily desirable in that result, as far at least as it could be destroyed by reasoning, and the demonstration of the truth that gold and silver do not differ in any respect, in their commercial character, from other commodities, were accomplished a few years after this date by Sir Dudley North, in his 'Discourses upon Trade, principally directed to the cases of Interest, Coinage, Shipping, and Increase of Money,' 4to., Lond. 1691.

Sir Josiah Child was of good family. In the chapter of his 'New Discourse of Trade' which relates to the support of the poor, he mentions his father, stating that he had much studied that subject. He was Richard Child, and, like his son, a merchant of London. He is stated to have been descended from John Child, the son of William Child, by Catherine, daughter of Sir Thomas Coventry, one of the Judges of the Common Pleas, the father of the first Baron Coventry, Lord Keeper of the Great Seal, and the ancestor of the earls of Coventry. As Judge Coventry died in 1606, Richard Child, who is stated to have died in 1638, could not well have been a more remote descendant than his grandson, and was most probably the son of his daughter. Her husband was one of the family of Child, Le Child, or l'Enfant, originally of Shropshire, but which had been seated at Northwich in Worcestershire since the middle of the fourteenth century. Sir Josiah was his father's second son: his mother was Elizabeth Roycroft, of Westonwick, in Shropshire, of a family stated to be originally from Abbeville in Normandy. He was born in 1630, was created a baronet in 1678, and died in 1699. He was thrice married. By his first wife, Anne, daughter of Edward Boat, of Portsmouth, who appears to have been a person in an inferior station of life, he had, besides two sons who died in infancy, a daughter Elizabeth, who married John Howland, Esq., of Streatham, in Surrey, and whose daughter Elizabeth married Wriothesley, son of William Lord Russell (the celebrated patriot), and in this way became Baroness Howland in 1695, and Duchess of Bedford in about a year after the death of her grandfather. Sir Josiah's second wife was Mary, daughter of William Atwood, Esq., of Hackney, merchant of London, and widow of Thomas Stone, also a London merchant; by her he had a son, Josiah, and two daughters, the elder of whom, Rebecca, married, in 1683, Charles, Marquess of Worcester, and became by him the mother of Henry, the second duke of Beaufort, who succeeded to the dukedom a few months before his grandfather died. She was afterwards re-married to John lord Granville, second son of John, first Earl of Bath. The third wife of Sir Josiah was Emma, the younger of the two daughters and co-heirs of Sir Henry Bernard, of Stoke, in Shropshire, Knight, and the widow of Francis Willoughby, Esq., of Wollaton, Notts, by whom she was the mother of Thomas, the first Lord Middleton, and of Cassandra, the second wife of James, first Duke of Chandos; her sister Elizabeth having been the mother of his Grace (the Timon of Pope, or the Grand Duke, as he was popularly called). Sir Josiah had two sons, Bernard and Richard, by this wife, who survived till the year 1735; 'at which time,' we are told by Morant, the historian of Essex, 'it was said she was nearly allied to so many of the prime nobility that eleven dukes and duchesses used to ask her blessing; and it was reckoned that above fifty great families would go into mourning for her.' Bernard Child died unmarried about a year before his father; Sir Josiah's successor in the baronetcy, his eldest son, of his own name, who had been knighted by King William before his father's death, and sat in parliament for Wareham, died without issue in 1704; and the title then devolved upon the last of the three brothers, Richard. He sat in the House of Commons first for Maldon and afterwards for Essex; and was made Viscount Castlemaine in 1718, and

Earl Tylney in 1732, both in the Irish peerage, having previously married Dorothy, daughter and heir of John Glynne, Esq., of Henley Park, Surrey, by Dorothy, daughter of Francis Tylney of Rotherwick, in Hants. Lady Tylney eventually inherited the Rotherwick estates; upon which, in 1734, the surname of Tylney was assumed under the authority of an act of parliament by her son John, who became Earl Tylney on the death of his father, the first Earl, in 1750. Upon his death without issue, in 1784, the title became extinct; and the estates devolved upon Sir James Tylney Long, the son of his sister Lady Emma, who had, in 1735, married Sir Robert Long, Bart., of Draycote House, Wilts. In 1812, Catherine, Sir James's eldest daughter and co-heir, married the Hon. William Wellesley Pole, who thereupon assumed the additional names of Tylney Long, and is now Lord Maryborough; his father, an elder brother of the Duke of Wellington, having assumed the surname of Pole in 1778, on succeeding to the estates of his cousin, William Pole, of Ballifin, Esq.; and the previous family name of Wellesley having been assumed, in 1728, instead of that of Colley, by the first Lord Mornington on succeeding to the estates of his cousin, Garret Wellesley, of Dangan, Esq. Of the estates of Sir James Long which came to Mr. Wellesley Pole in right of his wife, a principal portion consisted of the manor of Wanstead in Essex, which had been purchased by Sir Josiah Child of the heirs of Sir Robert Brooks, and upon which his son, the first Earl Tylney, had erected one of the most magnificent houses in England. This house, the building of which is said to have cost 360,000*l.*, its new possessor, whose wife died in 1825, sold in 1823 by auction for 10,000*l.*, one of the conditions of the sale being that the purchasers should clear everything away to the foundation before Lady-day, 1825.

(*The History and Antiquities of Essex*, by the Rev. Philip Morant, 2 vols. fol. 1768; Kimber's *New Peerage*, 1778; Collins's *Peerage*, by Brydges; *The Irish Compendium of Honour*, various editions; Brayley and Nightingale's *Middlesex; Annual Register*, various volumes; Anderson's *Chronological Deduction of Commerce*; Macpherson's *Annals of Commerce;* MacCulloch's *Principles of Political Economy*, and *Literature of Political Economy.*)

CHILD-KILLING. [INFANTICIDE, P. C.]

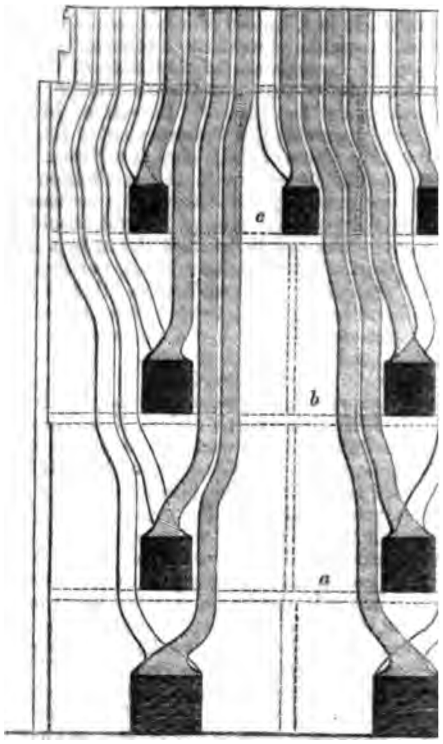
CHILD-STEALING. [ABDUCTION, P. C.]

CHIMNEY (derived immediately from the French *cheminée*, which conveys the idea of a narrow passage, a diminutive or feminine form of *chemin*, but primarily from the Latin *caminus*), an enclosed passage, funnel, or tunnel (see remarks on the etymology of TUNNEL, P. C., p. 368), for the escape of smoke from a fire-place or furnace. The office of a chimney is not merely the removal of smoke, but also the production of draught to excite the combustion of the fire, by the heating and consequent rarefaction of the column of air inclosed in the funnel, the rising of which causes a partial vacuum, which should be filled with air admitted either through or over the burning fuel. [SMOKE, P. C., p. 154; FURNACE, P. C., p. 21; WARMING AND VENTILATION, P. C., p. 71.]

The construction of house-chimneys is briefly treated of under HOUSE, P. C., pp. 327, 328; but the explanatory diagram of a stack of chimney-flues, referred to under BRICKWORK, P. C., p. 410, was omitted there. Before introducing it we shall enumerate, on the authority of Nicholson's 'Architectural Dictionary,' article 'Chimney,' the technical names given to the various parts of a chimney and fire-place. That which builders term the *fire-place* is the square recess or opening, facing the room, in which the stove is fixed or *set.* The *hearth* is the flat piece of stone, or marble, or metallic plate, immediately *under* the fire-place, while the large flat stone on the same level, but *before* the fire-place, though very commonly called the hearth, is technically called the *slab.* The vertical sides of the opening of the fire-place, and the projections from the face of the wall at each extremity of the slab, are the *jambs;* and the horizontal head of the fire-place, the ends of which rest upon the jambs, is styled the *mantel. Covings* are the oblique facings of stone, marble, or metal, sometimes applied to the inside of the jambs to reduce the space at the back of the fire-place. *Funnel* is a general name applied to the cavity or passage of the chimney, from the fire-place to the top of the wall, the lower part of which, where the sides are sloped so as to contract the passage from the dimensions of the top of the fire-place to those of the flue, is called the *gathering of the wings*, or simply the *gathering.* The *flue* is the long narrow passage which extends from the gathering to the top of the wall, and which, wl its course, should be of equal dimensions throu length; and the *throat* is the lower end of junction with the gathering. The *breast* is tl wall which faces the apartment, and forms th funnel which lies parallel to it: and the *back* wall of the flue, parallel with the breast, but a thest from the apartment. *Withs* are the na walls which separate one flue from another risin which form the sides of the flue, the *breast* a considered the front and back. A *stack*, or *ch* a wall containing a number of chimneys or flue by side. The *chimney shaft* is the turret ris roof, to conduct a chimney or stack of chimney height; and the *chimney-top* is the horizontal the chimney-shaft, which is commonly surmou *ney-pots*, to contract the upper end of the funn

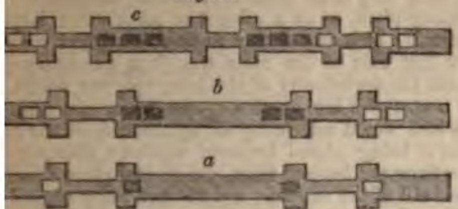
In modern English houses it is a common p the chimney-flues within the substance of the arrangement which, while it involves rather m than the older plan of forming them in the pr has the advantage of leaving the width and pr jambs entirely dependent upon the taste of Where this plan is adopted in the case of two ad the fire-places of which are back to back, the f houses may be brought into one plane, as illu annexed diagrams, *Figs.* 1 and 2. *Fig.* 1 arrangement of the flues in a four-story hous fire-places on each of the three lower floors, an

Fig. 1.



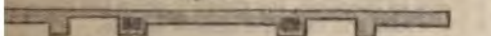
upper floor, making nine in all. Being one with their flues united into one stack, the num flues required is eighteen; but to show the arra distinctly, the flues of one house only are tinte of the adjoining house, rising from fire-places positions, but on the opposite side of the party in outline. The fire-places are indicated by a the positions of the floors and partitions are sh lines. *Fig.* 2 represents transverse sections or of the party-wall and flues, at the respective floors, *a*, *b*, and *c*, the flues of the one house be a dark colour, while those of the other, left *Fig.* 1, are shown white. If the stack were house only, the arrangement of the tinted set need to be a little altered, so as to bring them in the chimney-shaft. Were the flues of the sam formed in the jambs, instead of being in the sub party-wall, the transverse section of the wall

Fig. 2.



as in *Fig*. 3, the inner jambs being widened to re-
flues from the basement story; but the arrangement

Fig. 3.

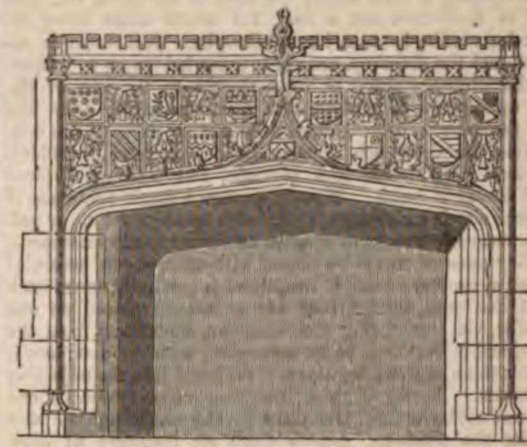


es in the upper storeys would be altered, so as to dis-
e flues as equally as possible on each side of the
. It is however impossible in a lofty house, with
his description, to avoid the disfigurement of unequal
ce it will inevitably occur that in some cases a fire-
have one flue in the one jamb and two in the other,
es on one side and three on the other. Another
advantage gained by placing the flues in the party-
at the projection of the jambs and breast may be
om fourteen inches, the projection necessary when
are in the jambs, to four inches and a half. This
is not apparent in the cuts here given, because
-places are made back to back they cannot be made
so far into the wall as in other cases, it being neces-
eserve a thickness of nine inches between the backs
o fire-places. The variations from the straight ver-
se necessary to enable the flues which rise from the
of the lower storeys to pass beside the fire-places of
reys, are useful in checking the tendency of the
to smoke, and are frequently increased for that pur-
nd the degrees necessary for their arrangement in
; but in making them it is very desirable to avoid
d sudden turns, which encourage the lodgement of
impede the operation of the sweeping-machine. It
needful to observe here the importance [SMOKE,
avoiding the communication of one flue with an-
uch an arrangement is now very rarely permitted,
in the case of a copper or oven flue, which is fre-
rned into a kitchen flue, instead of being carried up
to the top of the stack.

nsable as chimneys now appear, they are of com-
modern invention. Beckmann, who gives a long
n on their early history, with numerous references
s in antient writers bearing upon the subject (*His-
nventions*, English edition of 1814, vol. ii. pp. 62-
that the oldest certain account of chimneys with
was acquainted occurs in the year 1347, when
imneys at Venice were thrown down by an earth-
ut they were not in general use until long after that

subject of engine and factory chimneys the reader
lt Dr. Ure's 'Dictionary of Arts,' article 'Chim-
re it is stated that the celebrated Montgolfier was
to investigate the general principles of chimney-
as applied in manufacturing establishments. Dr.
sectional and other diagrams of one of the immense
eautiful chimneys at the Camden Town station of
on and Birmingham Railway, connected with the
of the stationary engines for working the Euston
lane. Hebert, 'Engineer's and Mechanic's En-
a,' vol. i. p. 364, describes a curious mode of con-
chimneys with circular flues enclosed within common
of an octagonal form, in such a manner that the
, which forms the only passage for the smoke, is
d by a current of hot air supplied by enclosed cham-
e back of the fire-place, the effect of which is greatly
e the draught. The internal flue is formed of a
edge-shaped kind of brick, which affords facilities
rmation of curves without any roughness or irregu-
he work, whenever it is desired to conduct the flue
entine direction. This plan, which is patented by
t, is said to have been adopted in several public
with success. In the better sort of houses the flues
imes so constructed that they may be swept from
in the basement story, without any communication
ooms into which the fire-places open.

CHIMNEY-PIECE. The assemblage of architectural dressings around the open recess constituting the fire-place in a room, and within which the fuel is burnt, either immediately upon the hearth itself, or in a raised grate or open stove. Accordingly, the fire-place being the spot around which persons naturally group themselves in an apartment, or near which they take their station—literally the focus of the domestic circle—the chimney-piece has always been made a principal feature and one chief point for decoration, so much so as to have come to be considered almost essential to the character of a sitting-room; for though an equal degree of warmth and a more equable temperature may be obtained by means of flues for hot air, a room has a rather blank and comfortless appearance without one; and though the want of a fire-place is not felt, the chimney-piece is missed as an architectural feature, there being about the same want of expression as there is in a house which shows no chimneys. Both chimney-shafts and chimney-pieces were therefore properly made significant and ornamental features in our antient domestic architecture. For a long time indeed, fire-places were used only for one or two principal rooms in a building, and were of very rude and primitive design, the funnel of the chimney projecting into the room, and sometimes sloping forward, downwards, and the opening for the fire-place being a simple arch, with scarcely any attempt at ornament. The more antient examples are those of mere fire-places rather than chimney-pieces. In domestic architecture much was exceedingly uncouth and inconvenient, at the time when the Gothic style had attained in ecclesiastical edifices what has been considered by many its highest perfection. But as soon as some degree of architectural refinement began to be introduced into the habitations of nobles, external dressings constituting a chimney-piece were added to the fire-place. The annexed example of one from Tattershell castle, Lincolnshire, may serve as a type for such internal feature where the Gothic style is employed, both on account of its marked fitness and propriety of character, and the happy union of simplicity with richness. It exhibits the style characteristically as employed for that particular purpose and no other, by those who were familiar with it, and who therefore did not, like modern Gothic designers, including Horace Walpole and his friend Bentley, look to tombs and gateways for ideas for chimney-pieces: here there is nothing borrowed from aught of the kind, nor from door or window. Some other examples—one from the same building, and two from Windsor Castle—are given in Pugin's 'Gothic Specimens,' all of them very similar in their general character and proportions, in which respect and in regard to compactness and simplicity of composition they accord much more nearly with modern taste, and have a less 'Gothic' air than the cumbrous and extravagantly ornamented chimney-pieces in the Renaissance style of the Continent and our own Elizabethan. In these the design was carried quite up to the ceiling so as to form a sort of architectural frontispiece, composed of two or more stages piled up on each other, adorned with columns, pilasters, caryatides, termini, niches, &c., and presenting an overloaded mass of carving and sculpture. But though such compositions were generally exceedingly capricious, and equally fantastic and coarse in detail, some were real works of art—truly admirable for artistic beauty of design and masterly execution. In the palace of Fontainebleau were many sumptuous structures—for so they may be called—of the kind, and among those still remaining is the one



in the ball-room, originally decorated with two bronze caryatides, larger than life, but for which columns are now substituted. Various magnificent examples, of the same period, occur in the Low Countries; two noted ones in the Hôtel de Ville at Courtrai, and one of matchless beauty for its exquisite carvings in chestnut-wood, in the Hôtel du Franc at Bruges. In our own country, chimney-pieces of the time of Elizabeth and James I. are by no means uncommon: many are remaining not only in mansions of that period which are still kept up, but in houses which have been almost completely modernized in all other respects. A great number and also a great variety of them may be found in Nash's 'Old English Mansions,' and Richardson's different publications illustrative of Elizabethan architecture. In general they are exceedingly heavy and cumbrous in their mass, 'over-informed' with ornament of all sorts, in the style of the ponderous cabinets of the time, and showing in fact sometimes like immense pieces of furniture of the kind, owing to their rather contrasting than according with the enrichment bestowed on other parts of the room. Some however are of comparatively sober design, and even those which are most extravagant as compositions, and over-loaded with ill-assorted details, are of interest as exhibiting numerous samples of ornament.

As the more regular Italian style gained ground, the fashion of chimney-pieces greatly changed; the decorated superstructure reaching from the chimney-piece itself to the ceiling was either discarded altogether, or greatly reduced so as to become no more than a carved framing to a pannel. The chimney-piece and fire-place were reduced to nearly their modern proportions and dimensions, whereas the opening or fire-place had previously been of such size that a person might stand within it, as it resembled that of a large open kitchen fire-place; which, putting aside other objections, caused a room to appear low by comparison. At present the *height* of the opening is made nearly the same in all cases, viz. from three to three feet and a half, the *width* alone being increased accordingly as a larger fire-place than usual is required, and the dressings around it extended so as to proportion the chimney-piece in some degree to the size of the room as a piece of architectural furniture in it: thus like other furniture its dimensions are limited by purpose and convenience, for were such as they dictate exceeded, the chimney-piece itself would look gigantic, and the mantel-piece would be out of reach. When therefore a single fire-place of the usual size is insufficient, as for very spacious rooms or galleries, there are two or even more according to circumstances, and they must of course be placed with strict regard to architectural symmetry: thus, if two, there is generally one at each end of the room, though both are sometimes placed on one side of it, viz. that facing the windows, equidistant from the centre, and if the room be an ante-room, with the door into it between them, and folding-doors at each end into the adjoining apartments. Again, if there are three chimney-pieces, one will be at each end, and the third in the centre of the side opposite the windows, though there are instances of even three being placed all on that side. More than that number are scarcely ever required,—even so many being rather for ornament and regularity of design than actual use. Apartments of such size as to require them on that account, are rarely used as ordinary sitting-rooms, and there is little occasion for fires in them at all when they are thronged with company. Still there is occasionally a greater number: the picture-gallery at Buckingham Palace, for instance, has no fewer than five chimney-pieces, viz. two on each side, and another at the north end. Fire-places are sometimes made on the window side of the room, which although by no means to be recommended for general practice, or for more than one or two rooms at the most in the same house, has its advantages in particular cases. It is a convenient disposition for them in libraries, because a person can sit and read by the fireside and a window at the same time; it is also very agreeable to have a chimney-piece so placed when the windows command a fine prospect; thirdly, it produces a difference of character between that and the other rooms. In such case there must of course be a central pier for the fire-place, and that pier must be of such width as to allow the chimney-piece to be placed against it without seeming to be squeezed in between the windows. It is objected that when the chimney-piece is so placed, not only is the window side of the room apt to look crowded, but the opposite one to look blank; but that depends entirely upon circumstances: in a library, the opposite wall would be sufficiently filled with bookcases; or in any other room a sufficient *balance may* be kept up between the opposite sides by hanging some very large picture, or mirror, immediately facing th chimney-piece, or by a cabinet or some other large piece furniture; or it may chance to be a very great convenience have that side of the room free from a chimney-piece, as affords the opportunity of obtaining spacious folding-doors the centre of it into another apartment, or else a recess, eith of which would sufficiently fill up that side of the room. In stead of being placed between windows, chimney-pieces a sometimes put *beneath* them, the mantel-piece forming the i ternal sill of the window, and the flue being carried up in o of the adjacent piers. Again, where fanciful effect is aim at, a chimney-piece is set in an architectural compartment e tirely filled with looking-glass, in which case the jambs a mantel-piece are made to project very considerably, so th doubled by reflection, the chimney-piece has the appearance being a solid and insulated mass of marble.

Marble is now the usual material for chimney-pieces ev in ordinary houses, and such very general employment of for the purpose has caused economy to be consulted by exce sive plainness of design and scantiness of workmanship, scul ture being out of the question; the mouldings very few a plain, and the mantel-piece a mere shelf. Chimney-pieces this class are manufactured by wholesale, and are kept like a other articles of furniture ready-made, requiring only to b fixed up when purchased. Convenient and economical as may be, such a system is not calculated to advance taste, sin a chimney-piece ought to be designed expressly for the par ticular room where it is to be put up. That is done of cours in houses of a superior kind, and yet in some recent instance there is so far from being that accordance between the sty of the chimney-pieces and the other architectural decoratio of the room, that, although the former call for rather a great than a lesser degree of embellishment, inasmuch as they ar more closely observed, they have frequently very much les consequently appear to be in a style of affected and hard severity in comparison with all the rest. Worse than this both style and keeping are sometimes so outrageously violated that chimney-pieces of 'crinkum-crankum' design, *à la Lou Quatorze*, are stuck in rooms whose other architectural dres ings are marked by the opposite extreme of soberness or eve plainness. Neither is that attention given to colour which ought to be: very dark or black marble is by no means th most suitable for such purpose, because instead of relieving the fire-place, the chimney-piece and fire-place together form a dull and sombre mass. This disagreeable effect is very greatly increased when—as is actually the case in the morning room of the new Conservative Club-house—black marble chimney-pieces are introduced among scagliola columns and pilasters of pale or bright hues: all consistency of composition as to colour is destroyed, and instead of being ornamental objects, the chimney-pieces look no better than two dismal blots in the architecture. In fact black is quite as unsuitable a colour for chimney-pieces as it would be for door-cases and window-dressings. Among collections of designs for chimney-pieces, Piranesi's 'Maniere di ornar di Camini' is unrivalled for magnificence of ideas.

CHINA. The first attempt of the English to open a trade with China was in 1596, when three ships, bearing letters from Queen Elizabeth, were freighted for that purpose, but they were lost on the voyage out; and no further attempt appears to have been made till 1637, when four merchant ships from England arrived in Macao Roads. In a few days they sailed up to the Bocca Tigris, which is considered the mouth of the Canton river; but in the mean time the Portuguese, already established at Macao and trading with the Chinese, had misrepresented the purposes of the English, who, having communicated with the mandarins, were directed to wait, and told that their wishes should be attended to. A few days afterwards they were, without warning, fired upon from the fort. Incensed by this act of treachery, they sailed up the river as far as Canton, stormed the castle, and carried off the guns. A further communication then took place with the mandarins, who laid the blame on the Portuguese. Cargoes were supplied by the Chinese, and the guns were restored, and the English ships sailed quietly away. Little o no commercial intercourse took place for some years afterwards. The East India Company established by degrees small commercial agencies at Amoy, at Ningpo, and on th islands of Chusan and Formosa; but the trade, owing to th exactions of the mandarins, proved so troublesome and u profitable, that the Company deemed it expedient to withdraw their agents from those places, and managed to establish trade at Canton, which continued to advance, but slowly a γ interruptions, in consequence of the high duties ĸactions to which it was subjected. Only one ship ɔ Canton in 1734, and during the whole of 1736 ıumber of European ships which took in cargoes at s only ten, of which four were English, two French, ı, one Swede, and one Dane. In 1644 the Mantars obtained possession of the government of the mpire, after a contest of more than twenty years.

ıctions and insulting assumption of superiority on ›f the Chinese authorities, as well as disputes with :h and Portuguese, led occasionally to outrage and ut the trade at Canton continued to advance, till at attention of the British government was drawn to g importance, and in 1788 Lord Cathcart was apıbassador to China; he died however on his passage he frigate in which he had sailed returned to Engı 1792 Lord Macartney sailed from England in hip as ambassador to the Chinese emperor at Peking, ed by Dr. Staunton, afterwards Sir George Staunton, ;y of legation, chiefly in order to obtain leave to ingpo, Tientsing, Chusan, and other places besides The embassy was unsuccessful, and the emperor, in nication to the king of England, stated that British was to be limited to the port of Canton.

ıe mission of Lord Macartney the general condition ıglish at Canton was considerably improved; the f the mandarins became less imperious; the exacr and less annoying; and though some of the heavins on the trade still continued, the commercial prothe English was tolerably quiet and rarely inter-

erruption however of some importance occurred in ɔnsequence of Admiral Drury, by direction of the ı Company, landing troops on Macao, for the pro-' that island against the supposed designs of the The Chinese, regarding Macao as a portion of their ıd the Portuguese as mere tenants at will, ordered h troops to be withdrawn; the order was not comı; the Company's trade at Canton was stopped in ce, and provisions denied to all British ships in the dmiral Drury, having in vain endeavoured to obtain :e with the viceroy at Canton, threatened to force the ips which the Chinese had placed across the river, ot carry his threat into execution. After fruitless s which lasted three months, the Chinese gained t; the British troops were withdrawn from Macao, s resumed, and Admiral Drury sailed away to

r dispute between the British and Chinese occurred n consequence of the British frigate Doris having he American ship Hunter, and brought her prize Canton river. The Chinese authorities directed the e of Merchants to send the Doris away, to which ıittee replied, that they had not the power. The ıuthorities thereupon began a series of aggressive not against the frigate, but against the mercantile y. The Committee of Merchants, feeling the agto be intolerable, determined on the bold measure of he trade. The Chinese, finding the weapon which nore than once used against the British now turned ıemselves, became more conciliatory. Sir George son of Sir George Staunton who had been in Lord γ's embassy, was appointed to manage the negotiaıe ultimately gained the principal points for which the ntended, which were then incorporated in an official signed and published by the viceroy.

c conduct of the Chinese authorities at Canton was the commercial transactions of Great Britain were ıes exposed to the risk of interruption from the d extortions of the official delegates at Canton, who ɔurt of Peking in profound ignorance of their own ırticipation in the profits of the illegal traffic and of ·essive conduct towards the merchants.

cipal object of Lord Amherst's embassy in 1816 nplain of the treatment to which British commerce :ted at Canton, and to fix it upon a solid and equi-;, with the means of appeal to the emperor himself in eed. Lord Amherst left England on the 10th of 1816, and the ships arrived in Macao Roads on the uly. Having been joined by Sir George Staunton s, the embassy reached the gulf of Pechelee on the uly, but the ambassador did not land till the 9th of The objects of the mission were not attained, and the ambassador, after reaching Peking, returned through the interior of China. Meantime the Alceste, the Lyra, and the Hewett Indiaman had returned to Canton, and the local authorities displayed their ill feeling by prohibiting the Hewett from taking in a cargo, and refusing to allow the Alceste and Lyra to anchor at Wampoa and take in provisions. The Alceste was fired at by the war-junks and the fort at the Bocca Tigris. A single shot silenced the junks, and a single broadside sent the garrison scampering up the hill against the side of which the fort is built. The effect of this decisive retaliation was, that provisions in abundance were sent to the Alceste at Wampoa, the Hewett was permitted to take in a cargo, and a statement was published which described the firing as a salute.

Though Lord Amherst's mission was unsuccessful, it was followed by a longer interval of freedom from Chinese annoyance than had ever before been experienced. From 1816 to 1829, not a single stoppage of British trade took place, except a short interruption in 1822, arising out of an unprovoked attack by the Chinese on some of the crew of the Topaze frigate, who were taking in water at the island of Lintin. In this case the Chinese local government at Canton made the first advances towards a resumption of the intercourse which had been suspended in consequence of the provocation on the part of the Chinese.

The illegal trade in opium had been driven in 1822, owing to the exactions of the Portuguese, from Macao to Lintin, a small island between Macao and the mouth of the Canton river. The local government of Canton, by its long course of secret participation in the profits arising from the sale of the prohibited article, and consequent connivance at the introduction of it, had placed themselves in such a position with respect to the emperor as well as Europeans, that they dared not interfere to protect their own subjects at Lintin, where armed European smugglers lay in defiance of their authority.

The exclusive trade of the East India Company with China terminated on the 22nd of April, 1834, and several private ships soon afterwards quitted Canton with cargoes of tea for the British Islands. The new act declared 'that it should be lawful for his majesty, by commission under his sign manual, to appoint not exceeding three superintendents of the trade of his Majesty's subjects with China, and to give to such superintendents certain powers and authorities.' Lord Napier was appointed chief superintendent, John Francis Davis, Esq., second superintendent, and Sir George B. Robinson third superintendent. The instructions, under the royal sign manual, dated Dec. 31, 1833, say, 'In execution of the said commission, you will take up your residence at the port of Canton,' &c., and the instructions from the Foreign Office, signed by Lord Palmerston, Jan. 25, 1834, say, 'Your Lordship will announce your arrival at Canton by letter to the viceroy.' The British government seem neither to have provided for nor indeed to have contemplated any objections on the part of the Chinese authorities, or any difficulty arising from their insolent assumption of authority and bigoted adherence to matters of ceremony connected with that assumption. Till 1834 the East India Company stood in the way of any interference on the part of the British government. With the whole trade under their control, they adopted the general policy of entire submission to the Chinese, their great object being to carry on their trade peaceably and without interruption, at whatever cost to the personal feelings of the supercargoes.

Lord Napier arrived at Macao from Great Britain on the 15th of July, 1834, on the 25th he sailed up to Canton, and on the 26th addressed a letter to the viceroy, announcing his appointment as chief superintendent, and requesting an interview. The letter was rejected on the ground that it was not superscribed with the character 'pin,' or 'petition.' This character had been used by the supercargoes of the East India Company, but Lord Napier, as a high officer representative of the British government, was expressly directed not to use it. On the 18th of August, Lord Napier was ordered to withdraw to Macao. The order was not complied with. On the 21st of August a shipment of cargo which had been announced by the Hong merchants was countermanded, and on the 2nd of September the British trade was entirely suspended by the viceroy. On the 4th of September the residence of Lord Napier was surrounded by a large number of soldiers, his native servants were driven away, and his supply of provisions was cut off. Under these circumstances Lord Napier sent for a guard of marines, and requested that the Imogene and Andromache might be sent up to the anchorage of the trade at Whampoa. The guard was sent up on the 6th of September, and the two ships sailed through the Bocca Tigris on the 7th, silencing as they passed the batteries which were opened on them. Negotiations ensued, and on the 15th of September Lord Napier announced to the British merchants that, having in vain used every effort to establish the commission at Canton, he did not at present feel authorized, by continuing to maintain his claims, to cause any further interruption to the trade of the port. The two ships then returned down the river, and on the 21st Lord Napier was embarked under a strong guard of Chinese officers and soldiers to proceed by the Inner Passage to Macao, where he arrived on the 26th, suffering from fever brought on by the noise, the heat of the weather, and the annoyance to which he had been subjected. On the 11th of October, 1834, he died.

Mr. Davis, who, previously to his becoming second superintendent, had been the chief supercargo of the East India Company, succeeded Lord Napier as first superintendent. Mr. Davis, on the 7th of August, 1834, had written to Lord Palmerston in the following terms:—'Lord Napier seems to be clear as to his instructions allowing him to decline any but a direct communication with the officers of government, and in the policy of his course I have no hesitation whatever in concurring; for to be governed by the Hong merchants, a system which has always been highly detrimental to our true interests, would now be infinitely worse than under the reign of the Company, whose transactions, amounting to some millions per annum, did of course give them great influence over those merchants. This species of influence is out of the question with us, who, unless we can have direct access to the government officers, can do nothing whatever. Lord Napier's letter of announcement was rejected on the most frivolous and inadmissible pretexts.'

Mr. Davis, in January, 1835, embarked for England, and was succeeded by Sir George Robinson as chief superintendent. Captain Elliot, who had previously been secretary, then became second superintendent. On the 21st of January, 1835, some of the crew of the Argyle, which had anchored on the coast of China in consequence of sea damage, were seized and detained by the local authorities. Captain Elliot, proceeding to Canton, on the 4th of February, for the purpose of demanding the restoration of the crew, was grossly assaulted by the authorities there, and forcibly removed. The crew of the Argyle however were restored on the 18th of February. On the 23rd of February several chests of opium, which had been seized from smugglers, were publicly burnt at Canton.

The reciprocal interests of China and Great Britain kept affairs tolerably quiet, and trade continued to prosper under the charge of Sir George Robinson during 1835 and 1836, the Chinese and British authorities carefully abstaining from any communication with each other.

Sir George Robinson was recalled by the British government, and Captain Elliot appointed chief superintendent. This order was received at Canton December 4, 1836.

The opening of the British trade in 1834, had given additional stimulus to smuggling of all kinds, and the illicit trade in opium continued to increase, though the edicts against it became more severe, and were more rigidly enforced. The smugglers were entirely driven from Lintin, in consequence of which the traffic extended not only to the east coast, but was carried on within the Canton river as far as Whampoa by Europeans in their own boats in the most audacious manner. Captain Elliot used every effort in aid of the Chinese authorities, to check the importation, at the same time adopting a system of conciliation which had the effect of making them more imperious. Their communications were always addressed to the Hong merchants: 'they are not addressed to me at all,' says Captain Elliot in one of his dispatches; 'they speak of me, not to me;' and he was directed to submit his communications to the Hong merchants, in order that they might judge whether the language was sufficiently respectful.

In March, 1837, an edict was received from the emperor allowing Captain Elliot to reside at Canton, and he continued to communicate by the medium of the Hong merchants, and to use the character 'pin,' or 'petition,' though both were repeatedly objected to by the British ministers, who thus kept Elliot squabbling with the Chinese authorities, without themselves taking any steps to get rid of the offensive formalities.

The aspect of affairs at Canton became more gloomy about the beginning of 1838. The differences between the officers of the two nations remained unadjusted, and a debt of more than three millions of dollars was due to the British factory from two insolvent Hong merchants, with little prospect liquidation. Admiral Sir Frederic Maitland arrived at Ma July 12, 1838, in the Wellesley ship of war, accompanied the armed brig Algerine. Captain Elliot joined him, and edict of the viceroy was sent to them through the old cha of the Hong merchants, which was returned unopened, w a notice that such a mode of communication was prohibi by the British government. Captain Elliot then proceed to Canton, and, to evade the 'pin' difficulty, sent an o paper to the viceroy by a mandarin, but it was returned wi a notice that it could not be received without the chara 'pin.' Meantime a British boat passing by the Bocca Ti was brought-to by a shot, and a mandarin came on board t ascertain whether Admiral Maitland was on board, saying that if he was, the boat would not be permitted to pa Admiral Maitland, on being informed of this insult, proceeded with the Wellesley and Algerine to require an explanation, the result of which was, a written disavowal of any intention to insult, with which the admiral was satisfied, returned to his former anchorage, and soon afterwards sailed away.

Fresh disturbances broke out in consequence of the smuggling of opium. Preparations were made on the 12th December, 1838, to strangle a Chinese opium-smuggler in the square immediately in front of the factories at Canton, wh the Europeans resisted, and the man was executed elsewh but a riot and contest with the Chinese afterwards ensued; t Europeans retreated within the factories, which the Chi then amounting to many thousands, attempted to force, b they were at length dispersed by a body of Chinese soldi Captain Elliot, on the 18th of December, published a noti requiring all British-owned vessels trading in opium to l the river within three days. The Chinese authorities how were not conciliated; on the 26th of February, 1839, a Chi opium-smuggler was strangled in front of the factories, i spite of the opposition of the Europeans; in consequen which insulting and offensive proceeding all the foreign f were struck, and remonstrances sent to the viceroy, to wh no answer was returned.

On the 10th of March, 1839, Lin Tsih Sew arrived at C ton as high commissioner from the imperial court, and i diately commenced a series of measures which rendered a between China and Great Britain unavoidable. In c quence of Captain Elliot's order (which in fact he ha authority to make nor any power to enforce) the opium- had left the river, but this was not enough for Commissi Lin. Having first sent round the Hong merchants to a tain by inquiry what arms the foreigners possessed for th immediate defence, he then, on the 18th of March, issued order commanding all opium in British ships, whether in th Canton river or on the coast of China, to be given up to th officers in order that it might be destroyed. On the 19th t foreign residents were forbidden to leave China, and on t 21st the factories were surrounded by soldiers, the n servants withdrawn, and the means of subsistence cut o Captain Elliot had joined his countrymen in the factories, a demanded passports, which were refused. The surrender o all the opium on board the ships was demanded of him, a under these circumstances of intimidation he issued a noti enjoining all British subjects to surrender to him all the opi under their control, for the service of her Majesty's govern ment, pledging himself as responsible, on the part of the g vernment, to each and all of them, for the value of the opi delivered up. Having ascertained that he could obtain 20, chests, he undertook to deliver them to the officers of Com missioner Lin. On the 20th of April half the quantity w delivered, and the remainder on the 21st of May. The bu ing and destruction commenced on the 3rd of June, and occ pied twenty days.

Meantime Captain Elliot had written to Lord Auckla then governor-general of India, detailing the system of v lence and spoliation which had been adopted by the Comm sioner, and requesting him to send as many ships of war a armed vessels as could be spared from the Indian stati This message had been sent by the Larne sloop-of-war, a there did not then remain a single British armed vessel in Chinese waters for the protection of British life and p perty.

After the delivery of the opium all foreigners were allo to leave Canton, except sixteen, who were afterwards h ever allowed to depart under an edict from the viceroy, wh commanded them never to return.

On the 29th of July, 1839, Captain Elliot warned the tish community, all of whom were now living in the dif ips, that he 'had moved her Majesty's and the rnments to forbid the admission of tea and other China into Great Britain and India.' This stop- le irritated Commissioner Lin excessively. He ıns of placards to induce the British to disregard iot's notice, and having gone down to Macao, ıtter of complaint to the Portuguese against Cap- ıat 'he had prevented the merchant-ships of his n entering the port of Canton.' Commissioner the most severe measures to prevent the use of e Chinese; but it was more eagerly sought for than ıe very strictness of the prohibition and severity ıres seemed to create a sort of mania for it which d restrain.

ray between the Chinese and some British and seamen, a Chinaman was killed. In conse- his homicide, an order was issued on the 15th interdicting the supply of any kind of food to in China, and on the 31st of August a pro- as issued calling upon the Chinese to arm and British, whose situation was becoming daily more dangerous, when, on the 11th of September, the tish frigate, arrived, and Captain Smith, the com- nediately published a notice of blockade of the on, on the ground 'that the regular supplies of en prohibited to her Majesty's subjects; that the ple had been ordered to fire upon and seize them ey went; and that certain of her Majesty's sub- en actually cut off.' The proclamation against the immediately withdrawn, provisions were no longer ınd Captain Smith then withdrew the notice of

sh frigate Hyacinth joined the Volage on the ber, and on the 3rd of November the two frigates ed by twenty-nine war-junks under Admiral e Chinese were beaten off with great loss; one own up, and several were sunk. On the 5th of 0, an imperial edict was issued, directing all trade Britain to cease for ever.

ese now made active preparations for the protec- anton river; the old forts were repaired and new , guns collected, fire-ships got ready, and troops On the 22nd of May the British merchant-ship tacked by eight junks and three large boats, when of the Hellas were wounded. On the 9th of June ful attempt was made to burn the British ships by -rafts. The British naval force was rapidly aug- ir Gordon Bremer hoisted his broad pendant on Vellesley, 74, and on the 22nd of June, 1840, blockade of the port and river of Canton in all , by order of the British government. British s continued to arrive, and within a day or two ice of blockade the chief command was assumed lmiral the Hon. George Elliot, who had just e Melville, 74.

orce having been left in the Canton river to main- kade, on the 30th of June, 1840, the fleet sailed long the coast of China, Rear-Admiral Elliot and ot having been appointed joint-plenipotentiaries vith the emperor the matters in dispute between ons.

nd of July, a boat sent into Amoy from the guns, and bearing a flag of truce, was fired upon. having poured in her broadsides with terrific batteries and war-junks, sailed away and rejoined inghai, the capital of the island of Chusan, was 5th of July, after a slight resistance; and on the , in consequence of the refusal of the authorities o receive a letter from Lord Palmerston to be to the Emperor of China at Peking, a blockade ed of the east coast of China, from Ningpo to the Yang-tse-keang, the most commercial part ot the ard of China.

d of July, 1840, the entire British force, including which had sailed to the north together with the ed in the Canton river, comprised three 74-gun 44 guns, three of 28 guns, five of 20 guns, two one of 10 guns, a large troop-ship, four armed l twenty-seven transports, having on board three soldiers, a body of Bengal volunteers, and a corps ppers and miners.

th of August, 1840, the Madagascar steamer, Elliot on board, entered the Peiho, which flows past Peking on the south and falls into the gulf of Pechelee, where the rest of the fleet arrived a few days afterwards. Lord Palmerston's communication was now received, and forwarded to the emperor at Peking, and a conference took place near the town of Tientsing between Captain Elliot and Keshen, the governor of the province. While the emperor's answer was expected, the greater part of the ships sailed northward up the Gulf of Pechelee, as far as the great wall of China. On their return, the result of the emperor's answer and the negotiations with Keshen was, that the two plenipotentiaries agreed to return with the squadron to Canton, whither Keshen was to be sent as imperial commissioner, to supersede Lin, whom the emperor described as 'no better than a wooden image.'

The squadron arrived, November 20, off Macao, on its return from the gulf of Pechelee, and on the 29th Rear-Admiral Elliot was compelled to resign his situation of joint-plenipotentiary, owing to sudden and severe illness.

On the 6th of January, 1841, in the midst of the negotiations with Keshen, an imperial edict was issued, requiring all British ships and men to be destroyed, wherever met with and in any manner. Meantime the Nemesis, a large iron war-steamer of extremely shallow draught of water, and built expressly for service in the Chinese rivers, had arrived, and was of the most important use in the subsequent warfare. In consequence of the violation of the truce, which appears to have been by the emperor's express order, the forts of Chuenpee and Tae-cok-tow were stormed and carried, and 173 guns taken or rendered unserviceable. These are the lowest forts in ascending the Canton river. On the same day the Chinese squadron of war-junks collected in Anson's Bay, under Admiral Kwan, were destroyed, and eighty guns taken. On the following morning the Bogue forts, that is, the forts which defend the Bocca Tigris, were on the point of being attacked, when a boat bearing a flag of truce was sent off to the flag-ship by Admiral Kwan, with a communication to Captain Elliot. Negotiations again commenced, the fleet retired to Chuenpee, and on the 20th of January Captain Elliot announced that a treaty of peace had been concluded with Keshen, by which the island of Hong-kong was to be ceded to the British, six millions of dollars were to be paid as indemnity, and trade was to be resumed at Canton within ten days.

The forts at Chuenpee were then given up, and the British took formal possession of Hong-kong on the 26th of January. On February 2nd, at the end of the ten days, the British were surprised that no proclamation was issued for opening the trade at Canton, and there were also rumours of warlike preparations going on up the river. Captain Elliot waited till the 10th of February: he then went up to Canton, and on the 11th fresh negotiations commenced between him and Keshen. Captain Elliot consented to a further delay of ten days for the preparation of a definitive treaty for signature; but before the ten days were expired it was discovered that the most extensive preparations were going on for a renewal of the conflict, and on the 20th of February Keshen published an edict which he had received from the emperor rejecting the treaty which Keshen had concluded with the British.

The British made immediate preparations for resuming hostilities, which were commenced on the 25th of February by the capture of a masked battery and eighty guns, and the following day was fixed for the grand combined attack on all the Bogue forts, which had now been made very strong. The attack was made, and all the forts taken, and their defenders killed or dispersed. Including the eighty guns captured on the previous day, the whole number amounted to 460 pieces, several of which were from 18 to 42 pounders. The Chinese killed and wounded amounted to 500, and 1300 prisoners were taken, who were soon afterwards set at liberty. Sir Gordon Bremer announced that of the British 'five men were slightly wounded.'

The fleet proceeded up the river on the 27th of February, and found other defences prepared a little below the island of Whampoa, consisting of mud forts, war-junks, and a great raft across the river, very solid and strongly constructed. All these defences were destroyed, and nothing remained but to attack Canton.

The approaches to Canton were imperfectly known, and while an examination was making the Chinese contrived to obtain another short truce. Sir Hugh Gough arrived from Madras, and on the 2nd of March assumed the chief command of all the land forces. On the 12th Keshen left Canton for Peking in disgrace, where he was afterwards condemned as a traitor, because he had not defeated the British; his property was confiscated, and he himself was banished to Tartary. On the 13th a bold exploit was undertaken and successfully executed by the Nemesis: this was the forcing of the Broadway Passage, or Inner Passage, a branch of the Canton river which leads almost in a straight line from Macao to Canton, and had never before been navigated by European ships or boats. This feat occupied the 13th, 14th, and part of the 15th of March: the Nemesis, attended by three armed boats, in many parts literally ploughed her way through the mud, and rejoined the squadron close to Canton. Opposition was made to the passage of the Nemesis, by forts and batteries on the banks of the river, by war-junks, and by armed mandarin boats. Only three of the British were wounded in the series of conflicts. Altogether 115 guns were rendered useless, nine war-junks were destroyed, and six batteries, several armed mandarin boats, and three military stations, with barracks and magazines, were captured or set on fire.

On the 18th of March the forts and all the other defences of Canton were taken, the war-junks and armed boats all dispersed or destroyed, and the city lay at the mercy of the British. Nothing further was done on the 19th, and on the 20th a suspension of hostilities was agreed upon between Captain Elliot and the new imperial commissioner Yang-Fang, who on the following day issued a proclamation, in which he stated 'that as Elliot had represented that all he wanted was peace and permission to trade as formerly, and as all trade depended upon the cherishing goodness of the Celestial Court, therefore it was right now to permit the English to trade as well as other people, in order to show a compassionate regard.'

The other two imperial commissioners associated with Yang-Fang did not arrive at Canton till the 14th of April. Meantime trade went on with activity but much caution; and rumours soon became prevalent of hostile preparations in active progress somewhere above Canton. The authorities displayed great dexterity in 'using words to conceal their thoughts,' but Captain Elliot was at length convinced that a treacherous plot was about to be executed, and he gave notice by proclamation to the Europeans in the factories to be prepared to leave Canton at a moment's notice. The plot exploded on the night of the 20th of May, the European inhabitants having previously been withdrawn from Canton. The sentries discovered several dark-looking masses dropping down the river; these proved to be fire-rafts consisting of boats chained together in twos and threes so as to hang across the bows of a ship while the combustibles were burning. They were set on fire by those who had the charge of them, when the Nemesis and boats immediately dashed among them, and towed them out of the way of the ships. Many of them drifted on shore, and set fire to the suburbs of the town, while masses of fire were seen floating down the river on all sides.

On the 25th of May the heights which command the city of Canton were carried by the British troops, but the breaching of the walls was deferred till the following day, when a flag of truce was displayed, and on the 27th the Chinese authorities agreed to pay six millions of dollars for the ransom of the city. Hostilities were consequently suspended, and on the 31st of May five millions of dollars were paid, and security given for the other million. The British forces then withdrew from Canton; early in June all the ships of war and transports were again at Hong-kong, and on the 16th of July the Canton trade was re-opened.

On the 10th of August, 1841, Sir Henry Pottinger arrived in Macao Roads, as sole plenipotentiary and chief superintendent of trade in China, a man eminently qualified by decision and determination, experience as a diplomatic agent in India, and a thorough knowledge of the Asiatic character, to counteract the manœuvres of the Chinese, and bring the war to a speedy termination. He was accompanied by Vice-Admiral Sir William Parker, by whom all the subsequent naval operations were conducted.

On the 12th of August, 1841, Sir Henry Pottinger issued a proclamation, announcing his appointment, and stating the objects of his mission, and on the 21st of August the fleet, consisting of thirty-six sail, including transports, with two line-of-battle ships, seven other ships of war, and four steamers, set sail northward along the coast of China.

On the 26th of August a notice was sent from the fleet to the town of Amoy, stating that it had been resolved to enforce the demands made in 1840 by Captain Elliot at Tientsing, and that if the town was delivered up to the British no
damage would be done. If this requisition wa
with, a white flag was to be displayed from the for
but as this was not done, hostile operations were
forthwith, and by five o'clock the whole of the out
were in the possession of the British. The town
on the following day; 296 guns were rendered
garrison was placed in the island of Kolingsoo,
mands the entrance of Amoy; and on the 5th of
the fleet sailed away.

On the 1st of October the town of Tinghae,
new and extensive defences, was re-captured;
10th of October the town of Chinhae, at the mo
Ningpo river, was also captured, with the loss to t
of several hundreds killed and wounded, and 15
which 67 were of brass, taken or rendered usel
British loss was three killed and 16 wounded.

The important commercial city of Ningpo, 12 m
river, was taken possession of on the 13th of Oc
authorities having abandoned it. The troops w
into winter-quarters at Ningpo. The weather set i
cold about the middle of December, when re
brought in of the assembling of large bodies of tro
up the river. A military expedition was therefor
upon, and a body of Chinese troops collected at t
Yu-yaou were dispersed, and pursued some mile
snow. The troops were re-embarked on the 30th
ber, and the steamers sailed down the river, and
opposite the town of Tsekee, which is about four
the banks. On the following morning the troops
town, which the authorities had abandoned. Th
Fung-hua, still higher up the river, was entered
of January, 1842, the soldiers and public officers
fled. In this case, as in the others, the stores in
granaries were distributed among the Chinese poo
damage was done except to the fortifications and
buildings.

A night-attack on Ningpo by the Chinese, on
March, was repulsed with some difficulty, but ultim
great loss to the Chinese. On the following nigh
attack was made by the Chinese on Chinhae, with
result. On the 15th of March 1000 men were em
board the steamers to attack a large body of tr
were encamped on the Segoan Hills, near the town
A large part of them were Tartars, who fought
greatest bravery, and when they found their efforts
nearly all of them refused to surrender, and many d
cut their own throats. The town of Tsekee wa
and treated in the usual way, and the expeditio
turned.

Ships of war, steamers, and transports continued
in succession during April. About the same time
bers of fire-rafts were discovered concealed among t
islands, and were destroyed by the Nemesis. On
May, Ningpo was evacuated by the British, and
force proceeded towards Chapoo, about 50 mile
Chapoo was captured on the 18th of May, after a
resistance by the Tartar troops.

On the 28th of May the fleet set sail, and on
June reached the entrance of the Yang-tse-kean
right bank of which is situated the small town of
at the mouth of the Woosung river, very strongl
On the 16th of June the batteries were attacked and
though they were manned by Tartar troops, who se
well and fought desperately. Altogether 150 guns w
of which 42 were of brass. On the 19th of June th
city of Shanghae, second only to Canton in comm
portance, was taken with little opposition.

Additional reinforcements had now arrived from
and it was resolved to proceed up the Yang-tse-kea
king, formerly the capital of China. Sir Henry
having issued a proclamation explanatory of the com
demands of Great Britain, on the 6th of July the fl
from Woosung for Nanking. The navigation of the
found to be difficult, on account of the numerous s
but the steamers overcame all obstacles. On th
July the defences of Chin-keang-foo were examine
the 21st the town was captured. There were a
Tartar soldiers within the town, and about 3000 i
ments without, who fought with reckless courage an
tion. The town was their stronghold, which the
impregnable, and when they found that all their eff
it were unavailing, the scenes of horror which ensu
from the cutting of the throats and strangulation

ıeir children, and themselves, are indescribable. The
ɔf British killed was 34, including 3 officers, and 107
, including 14 officers.

ɜrand Canal enters the Yang-tse-keang beneath the
Chin-keang-foo. The communications of the canal
w cut off and the immense traffic upon it entirely
by which a heavier blow was inflicted than even the
ɔf Nanking would have been.

e 10th of August the ships were in a position to bom-
city of Nanking, when communications took place
Sir Henry Pottinger and Elephoo and Keying, the
erial commissioners, who, by offering a ransom for
and various pretexts, endeavoured to obtain a cessation
ties, but nothing could overcome the determination of
sh plenipotentiary, and at daylight on the 14th of
he attack was ordered to be made, which the com-
rs were informed nothing could suspend except the
on of a document bearing the emperor's signature,
orizing them to treat definitively of peace. After
, and just three hours before the attack was to have
ed, the required document was produced, a cessation
ties ensued, and on the 17th of August Sir Henry
r announced that the state of the negotiations was
as to authorize him to require that hostilities should
nded.

ort was sent to the emperor by the commissioners, in
ıe true position of affairs was for the first time dis-
cinted out to him. Meantime visits of friendly cere-
ɔk place between the commissioners and Sir Henry
the flag-ship and within the walls of Nanking. At
ıe emperor's answer was received, and on the 29th of
1842, the treaty of peace was signed on board the
lis flag-ship, by Sir Henry Pottinger on the part of
itain, and by Keying, Elephoo, and Neukien, on the
he Emperor of China. The emperor's entire assent
eaty, signed on the 8th of September, was received
5th. On the 31st of December the great seal of
was affixed to the treaty.

e end of October the fleet had quitted the Yang-tse-
nd were assembled in the harbours of Chusan, and by
lle of November nearly the whole of the ships had
bled at Hong-kong. Some collisions took place be-
e factories and the Chinese mob, chiefly arising out
ntinuance of the opium smuggling, but a letter ad-
o the merchants and another addressed to the viceroy
lenry Pottinger, led to a proper understanding on
es, and the disturbances ceased. By the end of
r the whole of the transports and ships of war not
for further service in China had sailed from Hong-
their respective destinations.

ended the Chinese war, which may be said to have
ed with the blockade of Canton, June 22, 1840, and
s terminated by the peace of Nanking, August 29,
ring the whole of which, though the conflicts were so
and in many instances upon so large a scale, the
of British life in actual warfare was probably less
men.

ıost important provisions of the treaty of 1842 are
s:—

subjects are allowed to reside at the ports of Can-
y, Foochow, Ningpo, and Shanghae, and a consul is
ointed to reside at each of the five ports.

land of Hong-kong is ceded in perpetuity to Great

nperor of China agrees to pay 21,000,000 of dollars,
ix millions for the opium destroyed by Lin, three
s the amount of the debts of the Hong merchants,
ve millions as indemnity for the expenses of the
millions to be paid immediately, six millions in 1843,
ons in 1844, and four millions in 1845.

ɔmpany of Hong merchants are dissolved, and British
s are permitted to carry on their mercantile transac-
h any persons whatever.

itish subjects, whether natives of Europe or India,
be in confinement in any part of China, to be un-
ally released.

of tariff to be established at each of the five ports.

pondence between the officers of both governments
terms of equality.

ilitary post at Chinhae and the islands of Koolangsoo
san to be held by the British till the money pay-
d the arrangements for opening the ports to British
ts are completed.

A Supplementary Treaty was signed at Hoomun-Chae, October 8, 1843, to which is attached the tariff of export and import duties which are to be paid at the five ports. The following are the most important articles:—

Article 4, 'After the five ports of Canton, Foochow, Amoy, Ningpo, and Shanghae, shall be thrown open, English merchants shall be allowed to trade only at those five ports. Neither shall they repair to any other ports or places, nor will the Chinese people at any other ports or places be permitted to trade with them. If English merchant-vessels shall, in contravention of this agreement, and of a proclamation to the same purport, to be issued by the British plenipotentiary, repair to any other ports or places, the Chinese government officers shall be at liberty to seize and confiscate both vessels and cargoes; and should Chinese people be discovered clandestinely dealing with English merchants at any other ports or places, they shall be punished by the Chinese government in such manner as the law may direct.'

By article 6, 'It is agreed that English merchants and others residing at or resorting to the five ports to be opened, shall not go into the surrounding country beyond certain short distances to be named by the local authorities, in concert with the British consul, and on no pretence for purposes of traffic.'

Article 7 provides for the setting apart of ground and houses at the five ports for the residence of British subjects and their families, to be purchased at a fair valuation. This article concludes by observing that the number of houses 'cannot be limited, seeing that it will be greater or less according to the resort of merchants.'

Article 8: 'The Emperor of China having been graciously pleased to grant to all foreign countries whose subjects or citizens have hitherto traded at Canton, the privilege of resorting for the purposes of trade to the other four ports of Foochow, Amoy, Ningpo, and Shanghae, on the same terms as the English, it is further agreed, that should the emperor hereafter, from any cause whatever, be pleased to grant additional privileges or immunities to any of the subjects or citizens of such foreign countries, the same privileges and immunities will be extended to, and enjoyed by British subjects.'

Article 12: 'A fair and regular tariff of duties and other dues having now been established, it is to be hoped that the system of smuggling which has heretofore been carried on between English and Chinese merchants—in many cases with the open connivance and collusion of the Chinese custom-house officers—will entirely cease; and the most peremptory proclamation to all English merchants has been already issued on this subject by the British plenipotentiary, who will also instruct the different consuls to strictly watch over and carefully scrutinize the conduct of all persons, being British subjects, trading under his superintendence. In any positive instance of smuggling transactions coming to the consul's knowledge, he will instantly apprise the Chinese authorities of the fact, and they will proceed to seize and confiscate all goods, whatever their value or nature, that may have been so smuggled, and will also be at liberty, if they see fit, to prohibit the ship from which the smuggled goods were landed, from trading further, and to send her away, as soon as her accounts are adjusted and paid. The Chinese government officers will, at the same time, adopt whatever measures they may think fit with regard to the Chinese merchants and custom-house officers, who may be discovered to be concerned in smuggling.'

The other articles relate chiefly to commercial arrangements, to the arrest and punishment of offences committed by British and Chinese subjects, and to the stationing of a British cruiser at each of the five ports, for the enforcement of good order among the crews of the merchant-vessels, and to support the authority of the British consuls.

A treaty has also been concluded between the United States of America and China, which has not yet been published, but its substantial provisions have been stated in a letter from Mr. Cushing to the American secretary of state. The treaty appears to be in some respects more favourable than the English treaties; but Mr. Cushing, in closing his communication, remarks that his treaty, which is called, from the place at which it was concluded, the treaty of Wang Hiya, in the new provisions it makes, confers a great benefit on the commerce of the British empire; for the supplementary English treaty stipulates that any new privileges conceded by China to other nations shall be enjoyed also by England, and there is a similar provision in the treaty of Wang Hiya; and thus, whatever progress either government makes in opening this vast empire to the influence of foreign commerce, is for the common good of each other, and of all Christendom.

A 'Statement of the Foreign Trade with China, and an Account of the Inland and Transit Duties of the Chinese Empire,' dated Government House, Victoria, Hong-Kong, February 16, 1844, and received in London, June 5, 1844, gives the following summaries of the amount of the annual foreign trade of China :—

Exports.	Dollars.
Ship's disbursements and tonnage dues	500,000
Tea	9,450,000
Raw silk, silk thread, and silk piece-goods	2,747,000
Sugar and sugar-candy	370,000
Cassia	240,000
All other kinds of goods	532,750
Treasure, duty free	11,160,250
	25,000,000

Imports.	Dollars.
Opium, rice, treasure, and pearls, which are free, smuggled, or contraband	15,954,630
Ginseng, both kinds, much of which is smuggled	65,000
Raw cotton	5,000,000
Cotton manufactures of all kinds and cotton yarn	2,090,000
Woollen manufactures of all kinds	1,047,000
Metals of all kinds	261,650
All kinds of other goods	941,720
	25,000,000

By a return of the quantities and value of merchandize exported from the port of Canton in eighty-nine British vessels, of 43,012 tons burthen, during the half-year ending June 30, 1844, the total exports are stated to be 1,888,281*l.*, of which the principal articles are—Cassia lignea, 22,206*l.*; China ware, 9211*l.*; quicksilver, 8128*l.*; silk, fine, 190,565*l.*; silk, coarse, 42,335*l.*; silk manufactures, 22,987*l.*; sugar, raw (to Bombay and Sydney), 13,496*l.*; sugar-candy (to Bombay), 10,279*l.*; tea (to Great Britain, British India, Australia, Manilla, Singapore, and Lima), 1,504,570*l.*; vermillion, 8711*l.*

Chinese Weights, Measures, and Money. 1 pecul = 100 catties; 1 catty = 16 taels; 1 tael = 10 mace; 1 mace = 10 candereens; 1 pecul = 133⅓ lbs. avoirdupois; 1 ton = 16 peculs 80 catties; 1 cwt. = 84 catties; 1 lb. avoirdupois = 12 taels, or ¾ths of a catty; 1 tael = 679·84 grains troy; 1 chang = 10 Chinese feet or covids, and is fixed by agreement at 141 inches; a covid therefore = 14·1 inch; 1 foot = 8 tsun, or Chinese inches. A dollar is usually estimated at 7 mace 2 candareens, but in paying large sums 717 taels are equal to 1000 dollars In paying duties 11 to 13 per cent. must be added for the loss in melting the dollars. A tael = 1·39 dollar, but a mace in small amounts is calculated at 14 cents. Copper cash is the only coin made by the Chinese government, of which 1150 to 1180 are exchanged for a Spanish dollar, which is in general circulation for commercial purposes, and may be valued at 4*s.* 3*d.*, as an average value. Cash is not the Chinese name, but a name which it has acquired among foreigners. It has a square hole in the centre, through which is run a string, and they are thus threaded together in convenient numbers for paying away. The great circulation of the people is carried on by this medium, which, being of a low denomination, is extremely suitable to the price of the necessaries of life in China. For larger exchanges silver is indispensable; and, as great traffic is carried on among them, the amount of it in circulation must be very large.

Sir Henry Pottinger, at a dinner lately given to him at Glasgow (April, 1845), among other observations relating to the trade with China, said, 'Next to Canton is the port of Shanghae, which may yet be superior, because it is more open to the north to trade, and because it is more the resort of Chinese trading vessels than Canton. I have heard, since I came here, by a letter from China, that junks of the largest size come from the Yellow Sea, and go alongside of the largest British ships, and take their cargo bodily, and sail away. If the Chinese can only find the means of paying us, I may say the demand for our goods will be unlimited.'

(Davis's *Chinese*, 3 vols. 18mo.; *Narrative of the Voyages and Services of the Nemesis from* 1840 to 1843, from the Notes of Commander W. H. Hall, R.N., with Observations by W. D. Bernard, A.M., Oxon; *Parliamentary Papers*, &c.)

CHLORA, a genus of plants belonging to the natural order Gentianaceæ. It has 8 sepals, a rotate corolla with 6-8 segments withering round the capsule, the stigma bi-lamellate,
the anthers not altering, the capsule 1-celled
placentæ, the seeds angular.

C. perfoliata, yellow-wort, has the lowermost
tico-oblong, narrowed below; the leaves of the
perfoliate. The corollas are of a bright yellow
the stigmas are scarlet. The whole plant is glau
very subject to attacks of mildew. It is a nativ
hills and banks in most countries of Europe. It
England and Ireland, but not in Scotland. Lik
order to which it belongs, it possesses a bitter prin
renders its action on the system tonic. It may be
those cases of debility and in diseases where the
Gentiana and Erythræa are recommended. Its
perties are not however so powerful as in many o
of the order.

(Lindley, *Flora Medica*; Babington, *Manu*
Bot.)

CHLORIODIC ACID. [CHEMISTRY, P. C.

CHOANITES, a group of Spongoid fossils fro
of England and France, thus named by Mantell.
living forms occur on the coast of New Holland.

CHOCOLATE. [CACAO, P. C., p. 96; T
P. C., p. 313.]

CHODOWIECKI, DANIEL, a distinguishe
painter and etcher of the eighteenth century,
Danzig in 1726. His father was a tradesman of
Daniel was brought up to his father's business, wit
remained until the death of the latter in 1740.
removed to Berlin, and entered into the service of
brother as his bookkeeper. His uncle seems to
general store, and one class of articles which h
painted snuff-boxes, the paintings of which were
by Daniel in his leisure hours; many of them were
which art his uncle had had him taught for th
The designs were all copied from prints, and were
to Chodowiecki's own account, miserable perform
whole knowledge of drawing and painting he had
an aunt in Danzig. Chodowiecki continued some
ployed in this humble way, until through his ena
Haid, he made the acquaintance of some of the
Berlin, whose works and conversation excited his
and induced him in the year 1754 to devote himsel
and exclusively to art. He commenced as a
painter, and met with considerable success, bu
forsook this tedious art for etching. He etched
his own designs, and as an etcher he ultimately
reputation equal to or perhaps superior to that of
his age in Europe. His etchings are very numerou
ing to at least two thousand, but they are mostly
the greater part were executed for booksellers. A
of Berlin, of the name of Jakoby, published a com
logue of his prints in 1814, in one volume octavo
also a long list of them in his autobiography i
Meusel's Miscellany, arranged chronologically; a
in Heineken's Dictionary, arranged according to th
consisting in heads, portraits, historical piec
and profane, figures and original compositions;
illustrations for pocket-books and almanacs, from
and frontispieces, vignettes, and tail-pieces, for vari
The works engraved after Chodowiecki's designs o
by other engravers are less numerous than his own
but amount nevertheless to some hundreds; includi
designs for Lavater's work on 'Physiognomy,' e
J. H. Lips and others.

Chodowiecki was director of the Royal Acad
Arts of Berlin, where he died in 1801. Many of
are satirical, and he has been called the Hogarth
All his works, though on a small scale, are rem
their expression, and the character is seldom e
his subjects are chiefly illustrative of common life
porary and recent history. Many novels and
works which he illustrated, owed their success ch
some cases entirely to his vignettes; and the Alm
Berlin Academy, which he illustrated from the year
from the same cause, a circulation of about four tho
great success of these works led many booksellers
similar works with designs in imitation of Chodow
by other artists, and at the close of the eighteen
Germany was inundated with illustrated almana
books, and the like publications, to such a degree t
states that ladies and young people generally spent
part of the year in reading almanacs.

(Meusel, *Miscellaneen Artistischen Inhalts*;

des Artistes, &c.; Huber, *Manuel des Amateurs*,
, *Geschichte der Zeichnenden Künste in Deutsch-*

TODUS, a genus of fossil fishes from the moun-
: of Bristol and Armagh. (Agassiz.)

ɩITES, a fossil Fucoid from the green sand,
des Turgionii by Mantell, is thus entitled by
'Flora der Vorwelt.') It is very widely dissemi-
green sand deposits of Europe. Fucoides intri-
ngniart belongs also to the lower Cretaceous
Alps and Carpathians.

ɩUS. [Sea-Weeds, P. C.]

S COLLEGE, CAMBRIDGE, was founded
Countess of Richmond, mother of Henry VII.,
the site of a college founded by Henry VI.,
House, which seems to have been inadequately
Lady Margaret changed the name to that of
ege, made a munificent addition out of her own
ne former revenues, and incorporated the whole
enance of a master, 12 fellows, and 47 scholars,
ard VI. added another fellow and three scholars.
ch and Sir Thomas Baines founded two more
d two more scholarships, with revenues indepen-
ormer endowment.

ation was for divinity, and the twelve senior
obliged to take priest's orders within twelve
they have reached the proper age. The other
ips may be held by laymen. The twelve fel-
open to all counties, but there must not be more
w of any county at the same time. King Ed-
rship is also unlimited as to county. In the
he two fellowships founded by Sir John Finch
nas Baines, preference is to be given to the de-
he founders.

n fellows have an equal claim to the college
d are allowed to hold preferment with their
to a limited amount. The fifty foundation
are now augmented in value to 15*s.* a week
nce: they are open to natives of all counties,
st not be more than three scholars of the same
same time.

e foundation scholarships, there are various other
and exhibitions, which have been founded by
actors, in all about 44, with revenues appropri-
varying from about 2*l.* a year to about 25*l.* a year,
n may be held with the foundation scholarships.
Tancred, Esq. founded also four divinity student-
may be held till the degree of M.A. is taken,
w amount to 107*l.* 8*s.* per annum each.

s are the vice-chancellor and two senior doctors
r, if the vice-chancellor be of Christ's College,
f King's College is to supply his place.

ishop of London, in 1807 invested stock to the
0*l.* in the funds, the interest of which he directed
ed in the purchase of three gold medals annually,
led for by the students of Christ's College—one
value of 15 guineas for the best Latin dissertation
ence of Christianity; another of 15 guineas for
lish composition on some moral precept of the
ne of 10 guineas for the most distinct and grace-
chapel, combined with regular attendance there.
e medals there are five or six annual prizes of
value of from two to three pounds each set of
are bestowed at the different examinations.

18 benefices in the gift of Christ's College, of
in Cambridgeshire, 1 in Essex, 1 in Hertford-
icestershire, 2 in Lincolnshire, 5 in Norfolk, 1
onshire, 1 in Suffolk, 1 in Worcestershire, and
eshire.

ngs of Christ's College form a neat quadrangular
et by 120 feet, opposite St. Andrew's church;
are faced with stone. The elevation of the
aps somewhat too low for the length, but the
ower gateway improve the effect. There is also
n range of buildings which fronts the garden and
garden is pleasantly laid out, with open and
, alcoves, summer-house, bowling-green, and a
rounded by a small wilderness. The chapel, in-
nte-chapel, is 84 feet long, 27 feet wide, and 30
n the east window are portraits of Henry VII.
the family of the foundress. Near the altar is
f white marble to the memory of Sir John Finch
nas Baines, who were educated at Christ's College, travelled together in Turkey, and were remarkable for their friendship. Sir John Finch was ambassador in Turkey, and died there in 1682; his body was brought to England, and interred in Christ's College Chapel, and Sir Thomas Baines, who did not long survive him, was buried in the same vault.

Sixteen bishops have received their education at Christ's College, among the most eminent of whom are Latimer, bishop of Worcester, Law, bishop of Carlisle, and Porteus, bishop of London. Leland, the antiquarian; Sir Philip Sidney; Milton, the poet; Quarles, the poet; Saunderson, the mathematician; and Archdeacon Paley, were educated at Christ's College.

(Dyer's *History of the University of Cambridge*; Lysons' *Cambridgeshire*; Wilson's *Memorabilia Cantabrigiæ*; *Cambridge University Calendar*, 1845.)

CHROMATIC THERMOMETER is the name given by Sir David Brewster to an instrument consisting of several rectangular plates of glass placed with their surfaces in contact, and intended to measure the difference between the temperature of the glass and of any body, solid or fluid, which may be applied to it. The temperature induced in the glass must however be below that at which the latter would become red-hot.

The plates should be close together, in order to prevent any reflexion of light between them, and the upper edges of all should accurately fit the surface of a plate of metal which may constitute the base of a vessel intended to contain a heated fluid, when the temperature of a fluid is to be found.

The heated body, solid or fluid, being in contact with the edges of the glass plates, the inequality of strain caused by differences of temperature in the parts of each plate of glass gives rise to a polarizing action, by which, when the plates are held in a beam of light polarized by reflexion from the surface of glass or any other transparent body, the following phenomena take place:—A wave of white light appears first at the heated edge of each plate, and advances gradually from thence, sending before it an ill-defined dark band: nearly at the same instant a similar white wave, driving before it a dark band, advances from the opposite edge of the plate towards the former, and a white band or spot appears in the centre of the glass advancing towards both the heated and the opposite edge, compressing the dark bands so as to reduce them to two black fringes. To the white waves both at the edges and centre succeed fringes of yellow, red, purple, blue, &c., all parallel to the heated edge; and, at the same time, the like fringes form themselves on the sides perpendicular to that edge.

As these phenomena take place on all the plates of glass, the united effects are very distinctly visible on the plate at either extremity of the combination; and the maximum of tint produced at the centre of the plate is considered as a measure of the temperature acquired by the glass.

In order to form a scale, Sir D. Brewster applied to the edges of twenty plates, so combined, a temperature equal to 80° (Fahr.), that of the glass being 60°, so that the difference between the temperatures was 20°; and this difference produced a yellow tint of the first order in Newton's scale, which, in that scale, is expressed by 4 [Colours of Plates, P. C. S.]: therefore the tint on each plate, being one-twentieth of the whole, was equivalent to $\frac{4}{20}$, or 0·2; which thus becomes, on the scale of the chromatic thermometer, the indication corresponding to 20°. He then applied to the edge of one plate only, at a temperature equal to 60° (Fahr.), a heated bar of iron; and this produced in the centre a light green of the second order in Newton's scale, which, in that scale, is expressed by 9·35: hence, by the following proportion,

$$0{\cdot}2 : 20 :: 9{\cdot}35 : m \ (= 935°),$$

he obtained m, the difference between the temperature of the iron and glass. Then 0·2 (= $\frac{1}{5}$) being considered as one-fifth of the unit of the scale of the instrument, $\frac{935}{5}$, or 187, is the number of units in the scale between the indications of 20° and 935°, reckoning from the zero, that is, in an interval equal to 915°; but $\frac{915}{187}$ is equal to 4·9° nearly; and this is the value, in degrees of Fahrenheit's thermometer, of each division of the scale.

Since the eye may not be able to distinguish accurately the tints produced by the applied heat, Sir D. Brewster proposed to measure them by means of a piece of coloured crystal, two inches long, cut in the form of a wedge, so that the tints might become gradually deeper from the edge to the thick end: this being placed before the plate of glass, and moved till a situation is found where the waves or fringes on the latter exhibit two dark lines crossing each other; at that place the tints of the wedge and that of the glass plate are equal to one another, and, the former being given, the latter is consequently obtained. In this manner any tints produced on the plate may be compared together and referred to the scale of colours.

CHROMULE. [Sap, P. C.]

CHRYSOCO'LLA, from χρυσὸς, 'gold,' and κόλλα, 'glue,' is a name which the Greeks appear to have applied to borax, perhaps from its use as a flux in melting gold. The reference to Copper, in P. C., seems to have been an error.

CHRYSO'COMA, a genus of plants belonging to the natural order Compositæ, the sub-order Corymbiferæ, the tribe Asteroideæ, and the section Astereæ. The heads of flowers are not radiant; the florets are all hermaphrodite and tubular; the receptacle naked, alveolate (the alveoles with elevated dentate margins in the British species); the involucre imbricated, the pappus pilose, the fruit compressed, silky. The only British species of this genus is the *C. Linosyris*; it has herbaceous, linear, glabrous leaves, corymbose heads, and lax involucres. It has yellow flowers, and is found on limestone cliffs, but is a rare plant. It is the *Linosyris vulgaris* of De Candolle.

(Babington, *Manual of British Botany.*)

CHRYSOPLE'NIUM, a genus of plants belonging to the natural order Saxifragaceæ. It has a 4-fid, half-superior calyx, no corolla, 8 stamens (rarely 10), 2 styles, a 1-celled capsule with two beaks opening in the form of a cup. There are two species of this genus found in Great Britain, and known under the name of Golden Saxifrage. One is *C. alternifolium*, and is characterised by alternate leaves. It has an erect stem 4 or 5 inches high, with umbellate, nearly sessile, deep yellow flowers. It is a native of boggy places. *C. oppositifolium* has opposite leaves. The stem is decumbent and straggling, about 6 inches long. The flowers are paler and more scattered than in the last species. The leaves are usually glabrous, but sometimes they are slightly hairy. It is a native of damp, shady places.

(Babington, *Manual of British Botany.*)

CHURCH DISCIPLINE ACT. [Bishop and Bishopric, P. C. S.]

CHURCH-RATES are rates raised, by resolutions of a majority of the parishioners in vestry assembled, from the parishioners and occupiers of land within a parish, for the purpose of repairing, maintaining, and restoring the body of the church and the belfry, the churchyard fence, the bells, seats, and ornaments, and of defraying the expenses attending the service of the church. The spire or tower is considered part of the church. The duty of repairing and rebuilding the chancel lies on the rector or vicar, or both together, in proportion to their benefices, where there are both in the same church. But by custom it may be left to the parishioners to repair the chancel, and in London there is a general custom to that effect.

The burden of repairing the church was antiently charged upon tithes, which were divided into three portions, one for the repair of the church, one for the poor, and one for the ministers of the church. Pope Gregory had enjoined on St. Augustine such a distribution of the voluntary offerings made to his missionary church in England; and when Christianity came to be established through the land, and parish churches generally erected, and when the payment of tithes was exacted, the tithes were ordered to be distributed on Pope Gregory's plan. Thus, one of Archbishop Ælfric's canons, made in the year 970, is as follows:—'The holy fathers have also appointed that men should give their tithes to the church of God, and the priests should come and divide them into three parts, one for the repair of the church, and the second for the poor, but the third for the ministers of God, who bear the care of that church.' (Wilkins, *Concilia*, i. 253.) The same division of tithes was enacted by King Æthelred and his councillors in witenagemot assembled, in the year 1014. A portion of the fines paid to churches in the Anglo-Saxon times for offences committed within their jurisdictions, was also devoted to church repairs. The bishops were likewise required to contribute from their own possessions to the repair of their own churches. A decree of King Edmund and his councillors, in 940, headed 'Of the repairing of churches,' says that 'Each bishop shall repair God's house out of what belongs to him, and shall also admonish the king to see that all God's churches be well provided, as is necessary for us all.' (*Schmid, Gesetze der Angel-Sachsen*, i. 94.) One of King
Canute's laws says, 'All people shall rightly assist
ing the church;' but in what way it is not said. T
pretence however for interpreting this law of Canu
ferring to anything like church-rate. A payme
Anglo-Saxon church, called cyric-sceat (church
been erroneously identified with church-rate by som
This was a payment of the first-fruits of corn-seed
Martin's day (November 11), so much for every hid
to the church; and the laws of King Edgar and Ki
direct all cyric-sceat to be paid to the old minster.
i. 99, 165.) Cyric-sceat was otherwise called cy
amber being the measure of payment.

Churches continued to be repaired with a third of
after the Norman conquest, and to as late as the mid
thirteenth century. How the burden came to be sh
the tithes to the parishioners is involved in much
The following conjectural sketch of the rise of chur
from a pamphlet by Lord Campbell:—'Probably th
was very gradually shifted to the parishioners, and
tributions to the expense were purely voluntary. T
growing, it was treated as an obligation, and enforc
clesiastical censures. The courts of common law see
interposed for the protection of refractory parishione
statute of Circumspecte Agatis, 13 Ed. I., which
form of a letter from the king to his common law ju
siring them to use themselves circumspectly in all
concerning the bishop of Norwich and his clergy, no
ing them if they held plea in court Christian of su
as are merely spiritual, as 'si prælatus puniat pro
non clauso, ecclesia discooperta vel non decenter
Lord Coke observes, 'that some have said that this
statute, but made by the prelates themselves, yet th
act of parliament.' In the printed rolls of parlia
Ed. III. No. 62, it is called an ordinance; but in t
2 & 3 Ed. VI. c. 13, § 51, it is expressly styled a sta
it must now clearly be taken to be the act of the wh
lature. From the year 1285 therefore the bishops
thorized to compel the parishioners by ecclesiastical
to repair and to provide ornaments for the church
John (now Lord) Campbell's Letter to Lord Stanle
Law of Church-Rates, 1837.) But for long after t
ence of the custom of making the parishioners cont
the repairs of the church, and after the statute Circ
Agatis, the original obligation on the clergyman to
of the tithes was remembered. Lord Campbell quot
same pamphlet a passage from a MS. treatise in the
Collection, written in the reign of Henry VII. by
Dudley, a privy councillor of that king, which thus
the law for appropriation of the incomes of the clergy
part thereof for their own living in good househo
tality; the second in deeds of charity and alms to
folk, and specially within their dioceses and cures, wh
have their living; and the third part thereof for the
and building of their churches and mansions.' Ly
who wrote in the fifteenth century, says that by the
law the burden of repairing the church is on the re
not on the laity. 'But certainly,' he adds, 'by cu
the lay parishioners are compelled to this sort of r
that the lay people is compelled to observe this lau
tom.' (*Const. Legatin.* 113.)

Church-rates are imposed by the parishioners th
at a meeting summoned by the churchwardens for
pose. Upon the churchwardens, conjointly with the
devolve the care of the fabric of the church and th
ministration of its offices. With a view to provide
such expenses, it is the duty of the churchwardens to
parish meetings for the purpose of levying rates; an
neglect to do so they may be proceeded against cri
the ecclesiastical courts. They may also be punishe
ecclesiastical courts for neglecting to make repairs
money has been provided by the parish; but if the
funds in hand, and if they have not failed to ca
rishioners together, they cannot be punished. A
also is grantable to compel the churchwardens to ca
ing. If the parish fail to meet, the churchwardens
stitute the meeting, and may alone impose a rate; b
parish should assemble, it rests with the parishion
selves to determine the amount of the rate, or to neg
imposition of a rate altogether.

The repair of the parish church and the provisi
necessaries for divine service are thus entirely at the
the majority of the parishioners assembled. Before
formation the parishioners could be punished in the

court for failing to repair the parish church; and the
shment was to place the parish under an interdict, or sen-
e of excommunication, by which the church was shut up,
administration of the sacraments suspended, and any pa-
ioner who died was buried without bell, book, or candle.
there is now no means of compelling the parishioners to
vide church-rates. There is no remedy by mandamus: the
urt of Queen's Bench will grant a mandamus, as has been
ady said, directing churchwardens to call a parish meeting,
not to compel parishioners to make a rate. The ecclesias-
l courts cannot make a rate, nor appoint commissioners to
ke one. An obiter dictum of Chief Justice Tindal in de-
ring the judgment of the Court of Exchequer Chamber in
or in the Braintree case, has lately suggested the possibility
proceeding criminally against parishioners for voting against
ate, or absenting themselves from a meeting called to con-
r of a rate, where repairs are needed. In Braintree parish,
r the parishioners on meeting had refused to make any
the churchwardens had levied a rate of their own autho-
and proceeded against a parishioner for refusing to pay
ortion. The Court of Exchequer Chamber, to which the
hwardens appealed against a prohibition issued by the
t of Queen's Bench, confirmed the prohibition, and de-
the churchwardens' rate to be illegal. But in delivering
dgment of the court, Chief Justice Tindal made the fol-
g remark:—'It is obvious that the effect of our judgment
s case is no more than to declare the opinion of the court,
he churchwardens have in this instance pursued a course
athorized by law, and consequently all the power with
the spiritual court is invested by law to compel the re-
ion of the church is left untouched. If that court
powered (as is stated by Lyndwode, page 53, *voce* 'Sub-
,' and other ecclesiastical writers) to compel the church-
ns to repair the church by spiritual censures; to call
them to assemble the parishioners together, by due no-
to make a sufficient rate; to punish such of the pa-
ners as refuse to perform their duty in joining in the rate
communication, that is, since the statute of 53 Geo. III.
7, by imprisonment, and under the same penalty to com-
ach parishioner to pay his proportion of the church-rate,
ame power will still remain with them, notwithstanding
decision of this case.' In December, 1842, some pa-
ners of St. George's, Colegate, Norwich, were articled
e Court of Arches for having wilfully and contumaciously
ucted, or at least refused to make, or join and concur in
ing, a sufficient rate for the repair of the church of the
h. The articles were admitted by Sir Herbert Jenner
, the judge of the Court of Arches; but on application to
Court of Queen's Bench the proceedings were stayed by
ibition. Church-rates depend therefore entirely on the
of the majority of the parishioners assembled: and this
viously a state of things which, where dissenters from the
lished religion abound, may lead to parish churches being
to go to ruin.

he existing poor-rate of the parish is generally taken as
criterion for the imposition of the church-rate; but de-
ns as to poor-rates are not binding in cases of church-
, and the proper test for church-rates is a valuation by
petent judges, grounded on the rent the tenant would be
ng to pay for the premises. All property in the parish is
except the glebe-land of that parish, and the possessions
e crown when in the actual occupation of the crown, and
s of public worship. Stock in trade is not generally
for church repairs, but a custom may exist rendering it
ble in a particular parish. The ecclesiastical courts have
xclusive authority of deciding on the validity of a rate, and
iability of a party to pay it; but a ratepayer cannot by an
nal proceeding in those courts raise objections to a rate
he purpose of quashing it altogether. If he wishes to
te it, he ought to attend at the vestry, and there state
bjections; if they are not removed, he may enter a
t against the confirmation of the rate, or refuse to pay
ssessment. In the latter case, if proceeded against in
ecclesiastical court, he may in his defence show either
the rate is generally invalid, or that he is unfairly
ed. The consequence of entering a caveat is an appeal
e ecclesiastical judge, who will see that right is done.

retrospective church-rate, or rate for expenses previously
red, is bad. This has been often decided in the courts
mmon law and equity, and in the ecclesiastical courts.
reason is stated by Lord Ellenborough in the judgment
e court in Rex *v.* Haworth (12 East, 556):—'The
ar way is for the churchwardens to raise the money beforehand by a rate made in the regular form for the repairs of the church, in order that the money may be paid by the existing inhabitants at the time, on whom the burden ought to fall.' It has lately been decided by the Judicial Committee, in the case Chesterton *v.* Hutchins, reversing the decision of the Court of Arches, and confirming the previous decision of the Consistory Court, that a rate not retrospective on the face of it, but admitted to be partly retrospective, was bad.

Previously to 53 Geo. III. c. 127, the only mode of recovering church-rates from parties refusing to pay was by suit in the ecclesiastical court for subtraction of rate. By that statute, where the sum to be recovered is under 10*l.* and there is no question as to the validity of the rate, or the liability of the party assessed, any justice of the county where the church is situated may, on complaint of the churchwardens, inquire into the merits of the case, and order the payment. Against his decision there is an appeal to the quarter-sessions. By several statutes, principally the 58 Geo. III. c. 45, and 59 Geo. III. c. 134, acts passed for the promotion of building churches, the common-law powers of churchwardens have been varied, and extended so as to enable them to raise money on the security of church-rates, and to apply them for the enlargement, improvement, &c. of churches, and for the building of new ones, &c.

The levying of church-rates on dissenters, who are so numerous in this country, has caused so much irritation, and the frequently successful opposition of dissenters at vestry-meetings called to impose rates has rendered church-rates so precarious a resource, that various attempts have been made of late years to abolish them, and to substitute some more certain and less obnoxious provision for the repair of churches and the due celebration of divine worship. Lord Althorp, as chancellor of the exchequer in Lord Grey's government, brought in a bill for the abolition of church-rates in 1834, which proposed to charge the Consolidated Fund with 250,000*l.* a year, to be devoted to the repair of parish churches and chapels (including the chancel), and to be disbursed by commissioners after certificate from the quarter-sessions of the county in which the parish might lie, founded on a report by the county surveyor,—to place on the rector or lay impropriator, relieved of the duty of repairing the chancel, the burden of providing necessaries for the performance of divine service,—to leave the preservation of pews to the owners or occupiers, and to leave the provision and repair of bells, organs, and ornaments to voluntary contributions. This bill fell to the ground, principally owing to the opposition of dissenters, who viewed the substitution for church-rates of a charge on the public taxes as a mere shifting of the burden upon themselves, and objected altogether to being called upon to contribute to a church to which they did not belong. In 1837 Lord Melbourne's government made a second attempt to settle the question; and a bill was brought in by Mr. Spring Rice, chancellor of the exchequer, to abolish church-rates, and provide for the objects of them by a surplus created by a better management of the church lands held by the archbishops, bishops, and deans and chapters; these lands to be managed by commissioners, and 250,000*l.* a year to be the first charge on the surplus. The opposition of the church and of church lessees frustrated this measure, and no measure has since been brought forward by any government.

Lord Althorp stated, in introducing his measure, that the amount of church-rates annually levied was from 500,000*l.* to 600,000*l.*; and about 249,000*l.* was annually expended on the fabrics of churches. Mr. Spring Rice calculated that in 5000 parishes in England no church-rates are levied. There are endowments in many parishes for the repair of the church, which render church-rates unnecessary; and in many parishes arrangements have been made for voluntary subscriptions, to avoid squabblings between churchmen and dissenters, and the scandal of such disputes.

The Parliamentary Returns respecting local taxation issued in 1839 (No 562) give the following particulars respecting church-rates in England and Wales for the year ending Easter, 1839:—Total amount of rates and moneys received by churchwardens, 506,812*l.*, of which 363,103*l.* was derived from the church-rates, and 143,709*l.* from other sources. The total sum expended was 480,662*l.*, and of this sum 215,301*l.* was expended in the repair of churches. The debt secured on church-rates amounted to 535,236*l.* There is a more complete return for the year ending Easter, 1832, which shows some of the principal of the 'other sources' alluded to in the return of 1839. In 1831-2 the total amount which the churchwardens received was 668,814*l.*, derived from the following sources:—Church-rates, 446,247*l.*; estates, &c., 51,919*l.*; mortuary or burial fees, 18,216*l.*; poor-rates, 41,489*l.*; pews and sittings, 39,382*l.*; other sources not stated, 66,559*l.* The payments by the churchwardens in the same year amounted to 645,883*l.*, and included 46,337*l.* for books, wine, &c.; salaries to clerks, sextons, &c., 126,185*l.*; organs, bells, &c., 41,710*l.*; and repairs of churches, 248,125*l.*

CHURN. [Butter, P. C., p. 66.]

CHUSAN, or, as Lord Macartney writes it, the Cheusan Islands, are a group of islands on the eastern coast of China, and forming an appendage to the Province of Che-kiang. Their number is very great, and they are dispersed over that part of the sea where 30° N. lat. cuts 119° E. long. Staunton states, that between the Quesan Islands and Chusan Harbour, through a space of about sixty miles in length and thirty in width, the number of islands exceeds three hundred; but others, apparently not less numerous, lie north of Chusan Island. These numerous islands contain almost as many harbours or places of perfect security for ships of any burden. Most of these islands consist of hills rising with a regular slope, and rounded at the top. Though mostly close to each other, they are divided by channels of great depth. Some of them have a very inviting aspect, and one of them in particular, called Poo-too, is described as a perfect paradise. It belongs to a sect of religious men, and contains four hundred temples.

The principal island, which gives its name to the group, is about thirty miles long, and varies in width from six to eight miles. The surface is diversified by pleasant heights and well cultivated valleys. The principal harbour is on the southern coast towards the Chinese continent, and only a few miles distant from Kee-to Point, the most eastern cape of China. It is formed by three small islands, which lie about a mile from Chusan, and has four entrances; but these entrances are so completely shut in by the remoter points, that the harbour looks like a lake surrounded by hills, and it has excellent anchorage for vessels. About a mile from this harbour is the capital of the island, Ting-ghae. The intervening space is a plain, intersected with rivulets and canals, and cultivated like a garden. The road which traverses it, though good, is very narrow, in order that as little land as possible may be lost to cultivation. The town is enclosed by walls thirty feet high, which overtop the houses, which they surround like those of a large prison. Along the walls, at the distance of every hundred yards, are square stone towers. The interior of the town resembles Venice on a smaller scale. It is, in some degree, surrounded as well as intersected by canals, and the bridges thrown over them are steep and ascended by steps like the Rialto. The streets, which are no more than alleys or narrow passages, are paved with square flat stones. The houses are low and mostly of one story. The numerous shops contain chiefly articles of clothing, food, and furniture, which are arranged in good taste.

These islands are of great importance to China in a commercial view, especially for its intercourse with Japan. This commerce is chiefly carried on by the three commercial towns of Ning-po, Hang-sheou, and Shang-hae, which are situated on the continent opposite to the islands. The junks, by which this commerce is carried on, assemble at the Chusan Islands, and depart thence for Nangasaki. The islands are of importance, as protecting the commerce from the Strait of Formosa on the south, to the peninsula of Shang-tong on the north. If a foreign nation or a piratical chief should get possession of them, the whole coast above mentioned would be at their mercy, and the maritime intercourse would be interrupted. The Chinese are well aware of this circumstance, and in the last quarrel and negotiations with England showed that they were aware of it.

In 1840, when the disputes between the British and Chinese governments respecting some commercial transactions at Canton had reached such a height that England thought it expedient to appeal to arms, a British force was sent to the Chusan Islands, which captured them after a slight resistance. In consequence of the occupation of Chusan the Chinese government became more disposed to yield, and, after some negotiations, a truce was agreed upon near Tientsing, between the Chinese imperial commissioner and the British plenipotentiaries, who left Chusan for Canton on the 15th of November, 1840. On the 24th of February, 1841, the British troops were compelled to abandon the Chusan Islands on account of their unhealthiness. The which soon became alarming, appear especially arisen from the Chinese inhabitants having been or the government not to supply the British army w provisions; they were therefore obliged to live on and dry grain. A new appeal to arms was made, ar the Chinese were beaten near Canton, and only s city by paying a million pounds sterling, they r fulfil the conditions of the treaty of Tientsing the Chusan Islands were again captured in 18 a much more vigorous defence, and a British been sent to the continent, which took the town c hae, with its harbour Woosung, and advanced Nanking. Upon this the peace of 1842 was a [China, P. S. C.]

(Staunton, *Authentic Account of an Embassy to* *peror of China.*)

CHUVASHES. [Russia, P. C.]

CHYLE. [Digestion, P. C.]

CICENDIA, a genus of plants belonging to th order Gentianaceæ. It has a 4-parted funnel-shape without glands or any corona, eventually twisted capsule; the calyx 4-lobed, tubular; the stamens anthers erect, not twisted; the stigma capitate, u the capsule single, or imperfectly 2-celled. The s this genus were formerly referred to Gentiana and E

C. hyssopifolium has an herbaceous stem 4-sided, angles slightly winged; the flowers 6 or 8 together i whorls, each furnished with a linear spathulate b calyx 5-cleft, permanent, and closely embracing the b mature capsule. This is a common plant in many pa East Indies, and, like the whole of the order to wh longs, the plant possesses a bitter principle, thoug intense as some of its allies. It is employed by the India as a stomachic, and is administered in the for coction or powder. In addition to the tonic action, to act as a laxative.

C. filiformis (*Exacum filiforme* of Smith and ot the calyx 4-lobed, half-tubular, adpressed to the s tube of the corolla; lobes ovate, acute; stem threa forked; flowers solitary on long stalks. It has yello and is a native of Europe. It is found in damp sa in England and Ireland. In their cultivation the Cicendia require the same treatment as Gentians.

(Babington, *Manual;* Lindley, *Flora Medica.*)

CICHORA'CEÆ, one of the primary subdivisio system of Jussieu, of the natural order Compositæ. racterised by the absence of albumen in the seed; are erect, the corollas ligulate, the juice milky. T included under this division by Jussieu belong to dolle's Liguliforæ. The Cichoraceæ in their a structure closely resemble the Campanulaceæ; they semble that order in their physical properties. Bo produce a milky juice, possessing in some species medical properties. This juice in the Cichoraceæ ha and astringent taste, and possesses narcotic properti found in the Cichorium Intybus, the common [Succory, P. C.], and in the cultivated and wild [Lactuca, P. C. S.]. From the latter plants the been obtained under the name of Lactucaricum [L ricum, P. C.], and used as a narcotic, instead o Many of the species of Cichoraceæ secrete starch quantities, and are used as articles of diet, as the Scorzonera, Tragopogon, or Salsafy, &c. The ro Dandelion (*Taraxacum Dens Leonis*) is used as a purgative, and has lately been recommended in dise stomach [Leontodon, P. C.]. The British gener ing to this division of Compositæ are as follows:—

Section I. *Lapsaneæ*
Lapsana
Section II. *Hyoserideæ*
Arnoseris
Cichorium
Section III. *Hypochærideæ*
Hypochæris
Achyrophorus
Section IV. *Scorzonereæ*
Thrincia
Leontodon
Oporinia
Tragopogon
Picris
Helminthia

Section V. *Lactuceæ*
Lactuca
Taraxacum
Barkhausia
Crepis
Sonchus
Mulgedium
Section VI. *Hieraceæ*
Hieracium.

graphical distribution of Cichoraceæ is generally that of Compositæ, but they are found in greatest cold climates, and in this respect are the repre- of the Corymbiferæ, which are most abundant in s. [CORYMBIFERÆ, P. C. S.]

, *Natural System;* Babington, *Manual of British*

RO'LI, GIAMBETTI'NO, one of the most dis- of the Italian oil painters of the eighteenth century, t Salo, near Verona, in 1706. He studied first to Prunati, and afterwards, according to report, ra. There are several excellent works in oil by Verona, Pontremoli, Pisa, and at Parma. In the place there is a Journey into Egypt, in the church tonio Abate, much praised by Lanzi. In his style esembled Carlo Maratta, but he was inferior to ouring: his carnations are occasionally green, with d half-tints, and sometimes too red. He was a er of the works of Guido and of Correggio. With on of some works executed in his youth in Venice, paint in fresco; he found the practice injurious h.

lived chiefly at Verona, where he educated a chool, and he died there in 1770, possessed of wealth. He executed several works for other had several invitations to visit foreign courts, all wever he declined. In 1769 the Emperor Joseph Cignaroli in his studio, and observed afterwards, ona he had seen two very rare things—the amphi- the first painter of Europe.

d to have been a very accomplished man: he was riter upon art, and familiar with Latin. He had a tion of books on the arts, which he bequeathed to ny of Verona, which preserves his bust. A very memoir of him, by Padre Ippolito Bevilacqua dell' as published at Verona in 1771, the year after his

, *Geschichte der Mahlerey*, vol. ii.; Lanzi, *Storia* &c.)

I, LUDOVICO CARDI DA, Cavaliere, a very Florentine painter, was born at Cigoli in 1559. e of the great reformers of style of the Florentine one of those masters whose works formed an epoch ry of painting in Tuscany. Cigoli was the first sfully opposed the anatomical school of the imi- lichelangelo, and he was seconded in his efforts by regorio Pagani. [TUSCAN SCHOOL OF PAINTING,

as the scholar of Santo di Titi, but his style was on the works of Barroccio and Correggio, and had mmon with the eclectic school of the Carracci. It er quite independent of that school. His drawing lly correct; and in colouring and chiaroscuro he r to Barroccio, but inferior to Correggio, especially es. His chief productions are large altar-pieces, hich are considered the finest pictures in Italy. Man healed by St. Peter, in St. Peter's at Rome, Clement VII., is a very celebrated work, though yed, and was pronounced by Andrea Sacchi the e in Rome; the first being the Transfiguration, by nd the second the Communion of St. Jerome, by no, now hanging opposite to each other in the in the Vatican. There is also at Florence a Mar- St. Stephen, at the Nuns of Monte Domini, which ortona pronounced to be one of the finest pictures e. The Lame Man healed has been engraved by allot, and Scacciati. As a fresco-painter, Cigoli ccessful. He was also an architect; and he wrote treatise upon perspective, 'Prospettiva pratica di Cigoli Cav. e Pittore,' with diagrams engraved in his brother Bastiano Cardi. He also invented a -machine, for drawing objects in perspective from out the assistance of rules, an instrument which has times been brought to a high degree of perfection. Cigoli died at Rome in 1613, shortly after the completion of some frescoes painted for Paul V., in that pope's chapel in the church of Santa Maria Maggiore. Cigoli was himself dissatisfied with his works, and wished to repaint them, but the pope would not permit him. He was a Cavaliere of the Tuscan order of San Stefano, and a Knight of Malta.

(Baldinucci, *Notizie dei Professori del Disegno*, &c.; Lanzi, *Storia Pittorica*, &c.)

CI'LIA, in Anatomy, small moving organs found on the surface of the tissues of most animals, resembling hairs, and requiring the use of the microscope to be distinctly observed. They are mostly found on tissues which are in contact with water, or which produce fluid secretions. They are constantly in a state of active movement, and impart to the fluid with which they are in contact the same motion. This is called 'vibratory' or 'ciliary motion.' The best time for observing cilia with the microscope is when their movement begins to slacken. Their figure is generally that of slender conical or sometimes flattened filaments, which are broad at the base or root, and gradually taper to the point. Their size differs greatly on different parts of the same animal. 'The largest I have measured,' says Dr. Sharpey, 'are those on the point or angle of the branchial laminæ in the *Buccinum undatum;* they are at least $\frac{1}{500}$ of an inch long. I have not attempted to determine the exact size of the smallest, but Purkinje and Valentin state it at 0·000075 of an inch, while they make the largest they have met with only 0·000908 in., which is considerably less than I have found them; but they had no opportunity of examining marine animals, in which generally speaking the largest cilia are met with. In the sea-mussel the darker coloured cilia are about $\frac{1}{1000}$ of an inch long, the others considerably less.' The substance of the cilia is for the most part transparent and colourless, in some however a slight colouring may be observed. They assume also various forms, and Ehrenberg has described compound cilia in the Infusoria. In the Ciliograde Medusæ the cilia consist of rows of broad flattened organs, each of which is made up of several simple filaments joined together by a connecting membrane throughout their whole length. In most cases the cilia are arranged in regular order. On the gills of the mussel they are placed in straight rows; in many of the Infusoria they are arranged in circles or spiral lines. In some instances they are erect, but in others they are placed at right angles to the surface on which they are seated.

The movement of the cilia is not very rapid, and may be easily observed with a lens of $\frac{1}{33}$ inch focus. Their most obvious movement is of a fanning lashing kind, the cilium being bent in one direction and returning to it again. In addition to this movement, Mr. John Quekett has lately detected another in the cilia of the gill-rays of the common musse.. This consists of a slight movement of the cilia on themselves, each cilium turning on its own axis through the space of a quarter of a circle, with a movement like that of the *feathering* of an oar in rowing. This observation of Mr. Quekett's is of importance, as it explains how it is that the cilia are capable of propelling bodies over their points which could not be effected by the first-observed up and down movement. When the surface of an organ is examined on which are seated a large number of cilia, a wave-like motion in the whole is observed, which arises from the regularity with which each cilium is affected with the movement.

The cilia were first observed as present on the external surface of the bodies of infusory animalcules. Leeuwenhoek seems to be one of the earliest observers who described the presence of the cilia in animalcules. In his 'Continuatio Arcanorum Naturæ' he describes in many places the nature of the cilia in the common polygastric animalcules as well as in the wheel-animalcules. He also pointed out the probable use of these organs, for he says, 'Moreover it is necessary that these animals, and in general all such as are fixed and cannot change their place, should be provided with an apparatus for stirring up motion in the water, by which motion they obtain any matters that float in the water for their nourishment and growth, and for covering their bodies.' Since the period that Leeuwenhoek wrote, they have been observed in almost every species of Infusoria, and seem to be the active organs by means of which these animals move from place to place, and carry their food into their stomachs. In the polypes they are found in great numbers covering the surface of the tentacula by which these animals obtain their food. Although they have not been observed on the full-grown sponges, they have been described by Dr. Grant as existing upon the ova of these animals before they become fixed. Though not abundant in the Acalephæ, they have been seen by Grant and others in the Beroe pileus and other Medusæ. Dr. Sharpey has observed them in the various forms of the Echinodermata, and also in the Annelida. In the Mollusca they are very abundant, and one of the best means of examining these organs is afforded by the common mussel. Till within a recent period, it was supposed that cilia were confined to the invertebrate classes of animals, or at least the observation of their existence to any extent in the Vertebrata was very limited. One of the earliest observations of their presence in vertebrate animals was by Steinbuck a German anatomist, who found them upon the gills of the salamander. Within the last few years Purkinje and Valentin have devoted much attention to the subject, and have found that cilia exist very generally on the moist surfaces of the membranes of all the higher animals. The systems of organs on the surface of which cilia have been detected are as follows:—

1. *The Surface of the Body.* In this situation cilia have been detected in the Infusoria, Polypi, Medusæ, Actinia, Echinodermata, and in the larvæ of the Batrachian Reptiles.

2. *The Respiratory System.* Cilia have been detected in the lining membrane of the air-passages of reptiles, birds, and mammalia, in the gills of the larvæ of the Batrachia, and on those of the Mollusca and Annelida. Those on the external surface of the Infusoria, Polypes, and Medusæ must also be regarded as belonging to the respiratory system.

3. *Alimentary System.* They are found in the mouth, throat, and gullet of reptiles, in the entire alimentary canal of Mollusca, in the stomach of the Asterias, &c.

4. *Reproductive System.* Ciliary movements have been observed in the mucous membrane of the Fallopian tubes, in the uterus and vagina of mammalia, and in the oviduct of birds and reptiles. A peculiar ciliary movement has been observed in the embryo of many animals. This movement occurs while the embryo is in the ovum, the cilia producing a current in a certain direction along its surface, or causing the whole embryo to move in an opposite direction. In many instances, when the embryo has escaped the egg, it moves about by means of cilia in the same way as occurs in the naked gemmules of the sponge.

There can be little doubt that the functions performed by the cilia in these various parts of the body of animals are important; at the same time their absence in a great number of cases, in organs which perform the same functions as those which possess them, must lead to some hesitation before pronouncing a decided opinion with regard to their use. Where they are situated on the external surface of the bodies of animals, they seem to be the active organs of movement. Where respiration is carried on by means of the external surface, as in the Infusioria and polypi, the cilia assist this process by removing the used water, and bringing fresh currents to the surface containing the matter to be oxygenated. They may undoubtedly perform the same office when seated on internal respiratory membranes. On the surface of the reproductive organs of the higher animals they may also assist in bringing the unimpregnated ovum in contact with the fertilizing cells of the male fluid. The movement in the embryo has probably the same object in view as that on the respiratory membranes, the bringing the surface in contact with currents of oxygenated water.

In coming to the conclusion that the motions of fluids on the surfaces of membranes are produced by cilia where these organs exist, Dr. Sharpey observes, 'The currents cease when the motion of the cilia stops, they are strong and rapid when it is brisk, and feeble when it languishes; and though there are modifying circumstances or perhaps exceptions, yet in general the magnitude and velocity of the current seem to be proportioned to the size and activity of the cilia. It is true that while doubts remained as to the existence of cilia in several well marked instances where the water unequivocally received its motion from the surface over which it flowed, and independently of any visible contractions of the animal tissue, there was always considerable room to doubt, whether, even in the cases where cilia were manifest, the effect of these organs was wholly mechanical, and whether the motion of the water was not rather due to some peculiar impulsive power in the tissue, differing from mechanical action. But more extended observation has almost wholly removed these exceptions, while it has considerably increased the number of conforming instances, insomuch that there seems at present no necessity for having recourse to any other explanation of the motion of the fluids than that it is produced by the action of the cilia, and that their action is the result of muscular contractilit
property of animal tissues.'

There are however some remarkable excepti
Currents are observed in the sponge, in the stem an
of the Sertulariæ, but no cilia. There are also a
remarkable cases of the movements of fluids in
vegetable kingdom, which cannot be ascribed to th
of cilia, as those seen in the cells of Chara, Val
hairs of Tradescantia, &c.

For further information consult the article Ci
Sharpey, in the 'Cyclopædia of Anatomy and P
to which we are much indebted in drawing up t
also the paper of Purkinje and Valentin, entitled
tatio Physiologica de Phænomeno Motus Vibratori
&c., translated in the 'Dublin Journ. of Med.
Science' for May, 1835, and in 'Edinburgh N
sophical Journal,' vol. xix.

CIMICI'FUGA (*cimex*, a bug, and *fugo*, to dri
genus of plants belonging to the natural order Ran
The calyx is composed of four deciduous sepals; co
petals; styles one to fifteen; the carpels dry, dehis
seeded. The species are perennial herbs, with divi
and racemes of whitish flowers; the roots act as d
gatives and are poisonous.

C. fœtida, Stinking Bug-wort, has four almost
very villous ovaries; the racemes panicled; the
nate or biternate; the leaflets ovate-oblong, deepl
It is a native of the Carpathian mountains, Daur
Siberia, and the north-west coast of America.
fetid plant, and is used in Siberia for driving awa
fleas, just as tansy and wormwood are used in this

C. serpentaria, Black Snake-root or Bug-wort,
pound, very long racemes; the leaves triternate, w
or rather cut leaflets. It is a native of North Am
Canada to Florida. It has white flowers, and res
species of *Actæa*, to which genus it was formerl
under the name of *Actæa racemosa.* Like many
possessing active properties, it has a reputation
for healing the bites of snakes and preventing thei
effects on the system. There is one species, *C.*
native of Japan; the rest are American plants.
easily cultivated, preferring a moist shady situatio
be propagated by dividing the roots or by seeds.

(Don, *Gardener's Dictionary.*)

CINCIUS. L. CINCIUS ALIMENTUS, a
temporary Fabius Pictor, are mentioned by Dionys
carnassus (*Roman Antiq.* i. c. 6, ed. Hudson), as
of the Roman annalists. Alimentus is also frequ
tioned by Livy (xxi. 38, xxvi. 23, &c.).

The time of the birth and death of Cincius is
but he was actively engaged during the occupati
by Hannibal. Alimentus was of a plebeian family
quaestor B.C. 219, tribunus plebis B.C. 214, an
aedile B.C. 212. After Marcellus had taken Sy
left Sicily, Cincius held that province for two year
(Livy xxvi. 28, xxvii. 7), in the years B.C. 210 an
He took with him the soldiers who had survived t
Cannae. In the next year he had the command
force, with which he crossed over from Sicily t
which he made an unsuccessful attack, and was ob
treat. He was afterwards one of three commiss
were sent by the Senate to give their advice to T
Crispinus, the consul, who was lying wounded at
is not known whether it was at this time or later
into Hannibal's hands, a circumstance which ga
opportunity of acquiring a more exact knowledge o
of that period. He learned some facts from th
Hannibal himself (Livy, xxi. 38). Cincius wro
of Rome from the foundation of the city to his o
which Dionysius says that he treated minutely of
with which he was personally acquainted, but in
way of the events which followed the foundation
Neither the title of his work nor the number
known. The work of Cincius is stated by Dionys
been written in Greek, and there is no evidence t
this. Livy frequently mentions Alimentus, and in
(vii. 3) he calls him an exact authority.

Other works were attributed to Cincius—on
Leontini, on the Fasti, the Comitia, on the autho
Consuls, on the office of a Jurisconsult, on Military
Antient Words, and De Festis Mystagogicôn. B
certain that the Cincius who was the author of t
was the same as the historian, though it is likely eno

storian might write on military tactics. Gellius (xvi. 4) ves several extracts from the work on military matters, but simply calls the author Cincius. The chronological diffi- lty which Krause raises against the author of the treatise on ilitary matters being also the historian is not very great. is arguments against the probability of Cincius having ritten a grammatical work such as that on antient words are uch stronger; and indeed there is no sufficient evidence that e other works that have been mentioned as written by incius, were written by the historian.

The epoch which Cincius assigned to the foundation of ome is about the fourth year of the twelfth Olympiad, or c.728. The discrepancy from other reckonings is accounted by supposing that Cincius either followed other evidence an the annals of the Roman pontifices; or that he made his alculation by changing the lunar years of the early Roman ars, which were of ten months, into years of twelve months, ording to the reckoning of the period when he wrote. if we admit, as Junius Gracchanus states, that the old endar was in use to the time of the first Tarquin, which give a period of 132 years from the foundation of the y, we may adopt the following solution of Niebuhr:— If Cincius took these to be cyclical years, he got exactly a le (110 years) for the first four kings; and if he subtracted difference, twenty-two years, from the era of Polybius, the ult for the building of the city would be the very date, 12, 4' (Niebuhr, *Roman History*, Transl. i. 280).

The fragments of Cincius are printed in Krause's *Vitae et gmenta Veterum Historicorum Romanorum*, Berlin, 1833.

INERA'RIA, a genus of plants belonging to the natural er Compositæ, the suborder Corymbiferæ, the tribe Eu- riaceæ, the subtribe Senecioneæ, and the division Eusc- ioneæ. It closely resembles Senecio [SENECIO, P. C.], differs from that genus in its involucre being composed 1 row of equal scales only. Two species are found in at Britain.

C. palustris, a shaggy plant with a much branched stem ich is corymbose above, leaves broadly lanceolate, half- ping, the lower leaves sinuate-dentate. It has a stem 3 high, thick, hollow, and leafy. The florets are of a bright low colour. It inhabits ditches in fenny districts, and was ne time a more abundant plant in England than it is at sent.

2. *C. campestris*, a shaggy plant, with a simple stem, the t-leaves oblong, nearly entire, narrowed below; the stem- ves lanceolate, heads corymbose, involucre woolly below, rly glabrous in the upper half; the fruit hispid. It has a m 6 or 8 inches high with yellow florets. It is found ly on chalk downs. A variety, *C. c. maritima*, occurs r the sea in very wet seasons; it is then twice or three es as large as usual, and the lower leaves are dentate.

(Babington, *Manual of Brit. Bot.*; Lindley, *Natural tem.*)

CINQUE-CENTO STYLE. [RENAISSANCE, P. C. S.]

CIO'NE, ANDREA DI. [ORCAGNA, P. C. S.]

CIRCULAR POLARIZATION, in the undulatory ory of light, is the name given to a supposed circular rota- n of the particles of æther in certain media, when a pencil plane polarized light (or one in which the vibrations are posed to be rectilinear, in parallel directions, and in a ne perpendicular to the direction of the wave or pencil) is wed to pass through those media.

When a pencil of light polarized as usual, either by refrac- n or reflexion [POLARIZATION OF LIGHT, P. C.], is trans- ted through a plate of quartz in a direction parallel to the s of the crystal (the surfaces of incidence and emersion ng perpendicular to that axis), and is afterwards allowed to ss through a prism of any doubly-refracting material; it is nd to be divided into two coloured pencils, whose tints are mplementary to each other (or such as when mixed together uld produce whiteness): also, when the prism is turned nd upon the direction of the polarized ray, as an axis, the ours of the emergent pencils change successively; those in e of them from red to orange, from orange to green, &c., to olet; again to red, after performing half a revolution, and so n, while those in the other pencil take always the comple- ntary tints. These phenomena were first observed by M. ago, and an account of them is given in the 'Mémoires de stitut' for 1811; but the subject was fully developed after- rds by the researches of MM. Biot and Fresnel.

Let the doubly-refracting prism be turned on the axis of e polarized ray, or of the quartz plate, till one of the two ncils appears to be of a deep violet colour, in which case the yellow, or complementary light, may be conceived to be polarized in the plane passing through the original polarized pencil and the principal section of the prism; and let the angle which the primitive plane of polarization makes with the latter plane be observed.

Next, let the plane of quartz be removed, and a thicker one cut from the same crystal be substituted for it; then the image before examined through the doubly-refracting prism will not appear of a violet colour; but on turning that prism so that its principal section may make a certain angle, which will be greater than the former, with the primitive plane of polarization, the violet colour will be reproduced. The like will be found to hold good for all the homogeneous colours of the pencil; and, for each colour, the angle through which the prism is turned will be proportional to the thickness of the plate of quartz. The angle of the rotation by which the same tint is produced is not however the same for the different kinds of light; and it was found by Biot that the angle is greater, according as the pencils of homogeneous light are more refrangible. The effect thus produced on a polarized pencil of light, in traversing a plate of quartz, may be represented by supposing the plane of polarization, for rays of each colour, to revolve continually during the passage of the pencil along the axis of the plate. It is not however to be understood that there is any such revolving plane, and the phenomenon may be otherwise explained.

With different specimens of quartz, the angle through which the refracting prism must be turned to obtain the same colour in either of the images seen through it, when the thickness of the plate of quartz is increased, is variable; and M. Biot discovered that, with some specimens, in order to produce the same tint, the refracting prism must be turned from right to left, while with others it must be turned from left to right: as if the plane of polarization were caused, by contrary properties in different kinds of quartz, to revolve in contrary directions. This remarkable action upon light is found to have a dependence upon the form of the crystal; for those varieties of quartz in which the solid angles between the regular faces of the natural prism are cut off by planes unsymmetrically situated with respect to the axis cause the plane of polarization to turn from right to left, or the contrary, according as the cutting planes, on the face nearest to the spectator, incline towards the axis of the prism on his right or left hand.

The like rotatory polarization has been discovered to exist in several liquids, and even in vapours, and the circumstances were first observed, about the same time, by M. Biot and Dr. Seebeck. Oil of turpentine, oil of laurel, and some other liquids exhibit a polarization moving towards the right hand, while oil of lemons and concentrated syrup of sugar exhibit a rotation towards the left hand: the angles described by the planes of polarization when the same tint is produced in an image are, however, much less in all liquids and vapours than in quartz.

In order to account for the observed phenomena M. Fresnel assumed, as an hypothesis, a uniform circular motion of the particles of æther, within the substance of the quartz or of the fluids which possess the property above mentioned; and it is readily seen that such motion may result from the combination of rectilinear vibrations performed at the same time, by any number of particles, in parallel lines, with as many in lines also parallel to one another but at right angles to the former lines; all the vibrations being in a plane perpendicular to the wave or pencil of light, and those which take place in one set of parallel lines differing in phase (positions of the particles in the lines of vibration) by one-quarter of an entire vibration or revolution. For, the amplitudes of the rectilinear vibrations being equal to one another, let each be represented by a, and let y and z be the coordinates of two particles, at the same instant in their respective lines of vibration; then, the equation of vibration being, for one particle,

$$y = a \sin. p\,(vt - x),$$

the equation for the other will be

$$z = a \sin. p\,(vt - x - \frac{\pi}{2});$$

and from these equations we have

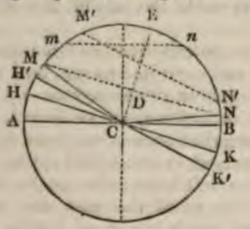
$$y^2 + z^2 = a^2,$$

which proves that two particles while performing vibrations at right angles to one another are always in the circumference of a circle. If the amplitudes of the vibrations had from any cause, as from the particles of æther being unsymmetrically distributed, been unequal, the resulting equation would have been that of an ellipse: in which case the polarization is said to be elliptical.

Now M. Fresnel, by a delicate experiment with wedges of quartz exhibiting apparent movements of the plane of polarization in opposite directions, ascertained that the original polarized pencil passing along the common axis of the wedges in a direction oblique to their common surfaces was, after transmission, really divided into two pencils, which being afterwards made to suffer two reflexions at the interior surfaces of a parallelopiped of glass were found to be polarized, one in a plane making an angle of 45° on the right hand of the original plane of polarization, and the other in a plane making an angle of 45° on the left hand; and the fact of this division of the pencils is a proof that the velocities of their waves within the quartz are unequal.

It is evident therefore that when the original polarized pencil is made to fall perpendicularly on the surface of a plate of quartz in the direction of the axis of the latter, in passing through the crystal, it becomes two pencils, such that the light of one is polarized at right angles to the light of the other while their waves move in the same direction with different velocities. Now, let each of these component pencils, after emergence, be conceived to be made up of two others, each of these last having an intensity of light equal to half the intensity of the pencil of which it is a component, and the particles in one of them differing in phase from those in such pencil by one-eighth of a vibration, in advance, while the particles in the other differ in phase from those in the pencil by one-eighth, in retardation, so that one component pencil differs from the other in phase by a quarter of a vibration: then, of the four pencils, there are two, one on each side of the original plane of polarization, in which the rectilinear vibrations are at right angles to one another, and differ in phase by a quarter of a vibration, and which consequently produce a circular rotation from right to left: the other two being such as will produce a circular rotation in a contrary direction.

In order to explain how light compounded of two pencils whose particles revolve in the manner just stated, and with unequal velocities, may produce the apparent angular movement of the plane of polarization which has been observed when polarized light passes along the axis of quartz: let a particle in one pencil set out from A, and a particle in the other pencil set out at the same time from B the opposite extremity of a diameter of the circle described by each: the velocities being unequal, and that of the particle which sets out from A being the greatest, let M and N unequally distant from A and B be the positions of the particles at the time of emergence. Join M, N, and from C the centre draw CE bisecting MN at right angles in D; then, if the equal lines CM, CN represent the equal attractions exercised on a particle at C, these forces may be resolved into MD, DC, and ND, DC, of which MD and ND being equal and acting in contrary directions destroy one another, and the resulting attraction is such as will create a vibratory motion in CE: in this case a plane passing through the diameter HK perpendicular to CE and to the circle will be the plane of polarization at the given time. But, in proportion as the plate of quartz is thicker, M′ and N′ being the points of emergence, the ratio of AM′ to BN′ at the time of emergence will be greater than that of AM to BN; and the plane of polarization passing through H′K′ parallel to M′N′ will make with AB an angle greater than BCK: thus the plane of polarization will seem to revolve about a line passing through C perpendicularly to the plane of the circle. The above explanation is, in substance, that which is given by Sir John Herschel.



The velocities of the particles in air being by supposition constantly equal, two points as *m* and *n* in a line parallel to AB would be the points of emergence; and the plane of polarization would constantly pass through AB.

Sir David Brewster has observed that the amethyst exhibits *phenomena which* indicate that, in it, the two species of
quartz which give rise to circular rotations in opposit
tions are crystallized together in very thin layers su
each other alternately; by which, when a plane
ray is made to pass through a plate of the mineral
pendicularly to the axis of the latter, on examining
transmission through a prism of quartz, curiously
fringes, varying with the position of the plane of
tion, may be observed.

CIRCUMFERENTOR. This instrument is a
surveying-compass, and its construction may be u
from a view of the diagram in the article Spiri
P. C., since, if the reader will imagine the telescop
instrument to be removed, and, for the supports,
sight-vanes or perforated plates to be substituted, th
ment will be a complete circumferentor.

Such an instrument, being far inferior to a theo
respect of the accuracy with which by its means a
be made, is not much used in Europe; but in th
States of America and in the British colonies, wher
less valuable, it is almost the only instrument employ

In using the circumferentor for the survey of a line
or the determination of the boundary of a tract of
instrument is set up, on its stand, successively at the
bends of the road or boundary line; and, a staff be
up vertically at the next bend which is visible from
of the instrument, the sights of the latter are directe
then the bearing of each station-line from the need
compass-box, that is, from the magnetic meridian, is
Each station-line is measured by the chain, and th
bends of the road or boundary are determined by
measured perpendicularly to that line. [Surveyin
pp. 328, 330. See also Compass, Azimuth, P. C.]

CIRRHUS. [Tendril, P. C.]

CISSUS. [Vitaceæ, P. C.]

CISTO′PTERIS. [Cystopteris, P. C. S.]

CISTUS, a genus of plants belonging to the natu
Cistaceæ. The calyx is composed of 5 nearly equal
a double row; corolla of 5 equal petals, somewhat
caducous; the stamens numerous; style filiform; stig
tate; the capsule superior, 5- or 10-celled, loculici
seed ovate, singular; the embryo filiform, spiral. Th
are shrubs or undershrubs with opposite leaves and
many-flowered peduncles. The flowers are either
white, large, resembling a rose.

C. Creticus, Cretan Rock-Rose, has spathulate
oblong leaves, somewhat hairy, downy, dull green,
wavy at the edge, and stalked; the petioles furrowe
distinct, the peduncles 1-flowered; sepals with a lo
point and villous; white flowers. It is a native of dr
the most southern parts of Europe. It has evergre
which emit a balsamic odour when rubbed or after da
weather in the summer. It yields, with many othe
of Cistus, a gum-resin called Ladanum [Ladanum,
formerly in great repute as a stimulant in medicine,
used by the Turks as a perfume.

C. laurifolius, the Laurel-leaved Gum Cistus, or Ro
has stalked ovate-lanceolate three-nerved leaves,
upper surface glabrous and the under surface toment
footstalks dilated and connate at the base; the capsule
It is a native of the south of France and Spain. It
flowers with a yellow mark at the base of each petal.

C. ladaniferus, Gum Cistus, has almost sessile le
nate at the base, linear lanceolate, 3-nerved, the upp
glabrous, the under surface tomentose; the capsule
It is a native of the hills of Spain and Portugal. T
ties are described, one with white petals having a ye
at the base, the other with white petals and a blood
spot at the base.

C. Ledon, has connate leaves, oblong lanceolat
upper surface smooth, shining, under surface silky vi
flowers in corymbose cymes; the peduncles and caly
with silky villi. It is a native of the south of France.
species of Cistus here enumerated are said to yield
Ladanum. Many species which were formerly
under Cistus are now referred to Helianthemum. [
themum, P. C. S.] This is the case with the wh
old British species of Cistus. The flowers of b
genera are very beautiful, and are remarkable for las
one day, opening with the rising of the sun in the
and perishing with the setting sun of the evening.
species of Cistus are worthy of cultivation in garden
should be kept in the greenhouse in the winter,
during mild seasons and against a south wall they wi

air. They may be propagated by seeds as layers
ed cuttings procured in July or August, which, if
er a hand-glass, will root readily.
ardeners' *Dictionary*; Lindley, *Flora Medica*.)
ION, a process in the commencement of a suit by
parties are commanded to appear before the
courts.
N, from the French word *citoyen*, which remotely
the Latin *civis*. Aristotle commences the third
s 'Politik' with an investigation of the question,
itizen (πολίτης)? He defines him to be one who
in the judicial and legislative power in a state;
rves that his definition strictly applies only to a
l form of government. The Roman word Civis, in
and proper sense, also meant one who had some
sovereign power in the state. The word citizen
take it in its historical sense, cannot apply to those
subjects of a monarch, or, in other words, of one
complete sovereign power. It is consistent with
e and modern usage, and it is also convenient to
ord citizen only to the members of republican go-
which term, as here understood, comprehends [Re-
C.] constitutional monarchies. The term consti-
archy is not exact, but its meaning is understood:
of republican government at the head of which is
erson with some equivalent title, whose power and
hereditary. Constitutional monarchies approach
lute monarchies when the constitution gives very
to the people, and this little power is rendered
y the contrivance of the prince and his advisers.
al monarchies are of an aristocratical character
political power is vested in the hands of a minority
all when compared with the majority; or they
ch to a democracy, and differ from it mainly in
ereditary instead of an elective head. Citizenship
here understood as only applying to those states
e constitution, whether written or unwritten, gives
o are members of such states, or to some consider-
r of them, some share of the sovereign power.
l form in which citizenship is acquired is by birth;
orn of citizens. In the old Greek states, and
those states of antiquity where citizenship existed,
only mode in which as a general rule it could be
A person obtained no rights of citizenship by the
stance of being born in a country or living there.
could only be conferred by a public act either on
l or on all the members of other communities.
f religion was one of the causes of these commu-
ding strangers from their political body. The
em was at first a close community, but the practice
g aliens (peregrini) to the citizenship was early
They were even admitted by the old burgers
ns) in considerable numbers, but only by a vote of
e body of patricians. The admission of aliens to
hip, either partial or complete, became a regular
Roman polity to which Rome owed the extension
, her language, and her power. It is true that
of admission went on slowly, and for a long time
unwisely, and with danger to their state, resisted
of their Italian allies, or subject people, who de-
Roman citizenship; but this claim was finally
vour of the Italians by the Social or Marsic War
and by the concessions that followed that war.
uences of this war were, that all the inhabitants of
of the Po became Roman citizens, and forty years
he privilege was extended to the inhabitants north
We find some instances, before the Marsic war,
of Italy declining admission into the Roman poli-
they preferred their own constitution to the rights
of Roman citizens. Under Justinian all free per-
the Empire were Cives; but Citizens had then
jects, for the Emperor was Monarch.
man system did not allow a man to claim the
by birth, unless he was born of such a marriage as
cognised to be a legal marriage. If a Roman mar-
n who belonged to a people with whom the Roman
ised no intermarriage (connubium), the child was
n citizen; for he was not the child of his father,
nly as the child of a Roman father that he could
n citizenship. This was the strict principle; but
at if a Roman woman had a child by a man with
was no connubium, the child was legally a Roman

The English law gives the citizenship to all persons who are born anywhere of a British citizen or of one whose father or father's father was a citizen of Great Britain. The English law also gives the citizenship to every person born in the British dominions; which rule originated in the king claiming such persons as his subjects who were born within his dominions. In the earliest periods of English history, those were properly called subjects who may now properly be designated citizens, though citizenship in England must be divided into two kinds, as it was in Rome. Some native citizens do not enjoy the suffrage, nor are they eligible to certain offices, such for instance as a membership of the House of Commons. But these are not permanent and personal disabilities: they are temporary incapacities arising from not having a certain amount of property, and therefore the complete citizenship may be acquired by every man who can acquire the requisite property qualification. It follows from what has been said that those who happen to be under this disability are not full citizens, but have a capacity to become such. Those who have not the suffrage are in the situation of subjects to that sovereign body, of which those who possess the suffrage form a part. Thus the word subject may apply to some persons who live in a republic, as it does apply to all who live under a monarchy. The terms on which foreigners are admitted to the citizenship are different in different countries. A recent act of parliament (7 & 8 Vict. c. 76) has rendered the acquisition of partial citizenship in England much easier and less expensive than it was under the former process of a special act of parliament. [Aliens, P. C. S.]

The United States of North America have had various rules as to the admission of aliens to citizenship; but at present they require a period of five years' residence as a preliminary to obtaining the citizenship. Some persons in that country would extend the period of probation to twenty-one years. This however would be a very impolitic measure, for if foreigners will throng to a country such as the United States, with the view of settling there, the best thing is to make them citizens as soon as they wish to become such; and there would be manifest danger to the United States if the large number of foreigners who settle there should be considered as aliens for a period which would extend to the whole term of the natural life of many of the new settlers. Indeed there seems to be no objection to giving to aliens in republican governments, as soon as they choose to ask for them, all the rights and consequent duties of citizens, if they are ever to have them. It may be prudent to exclude aliens by birth from some of the high offices in a state, which is done in England and in the United States of North America.

In antient Rome, aliens were not always admitted to the full rights of Roman citizens; and indeed in the early history of the state, even the plebeians formed a body who were without many of the privileges which the patricians enjoyed. A person might receive the Roman citizenship so far as to enjoy every advantage except a vote at the public elections and access to the honours of the state. This however was not citizenship as understood by Aristotle, nor is it citizenship as understood by the free states of modern times. The acquisition of complete citizenship implies the acquisition of a share of the sovereign power: the acquisition of all the rights of a citizen, except the suffrage and access to the honours of the state, is a limited citizenship; and it is no more than may be acquired in those states where there is no representative body, and in which a man by such acquisition gets not citizenship, but the state gets a subject.

The great facilities for a man changing his residence which now exist, and the increased motives to such change in a desire to better his condition by permanently settling in another country, lead to emigration from one country to another, and more particularly from Europe to America. The advantage which any country receives from the emigration of those who possess capital or peculiar arts is so great that, under the present circumstances of the world, it is not easy to discover any good reason for republican governments refusing to give the citizenship to any person who comes to another country with the view of settling there. A difficulty will arise in case of war when a man owes a divided allegiance, for it is a principle of English law that a man cannot divest himself of his allegiance to the king of England; and probably an American citizen cannot divest himself of his allegiance to the United States. And yet the two countries which maintain this principle, allow the citizens of any other country to become citizens of their several communities. The Roman principle under the Republic was, that as soon as a Roman was admitted a citizen of another state he ceased to be a Roman citizen, because a man could not belong to two states at once; wherein we have one among many examples of the precision of Roman political principles. The same principle must certainly be adopted some time into the international law of modern states.

The nations of Europe and the states of the two Americas have all a common religion, which however contains a great number of sects. A person of any religion in the United States of North America may become a citizen, and his opinions are no obstacle to his enjoying any of the honours of the country. But this is not so in England. No man for instance, though an English citizen, can be a member of the House of Commons unless he is, or is willing to profess that he is, a Christian. The declaration to be made by members of the House of Commons, which contains 'upon the true faith of a Christian,' excludes all who will not profess Christianity. Its practical effect at present is to exclude only Jews; for all other persons call themselves Christians, whether they believe in the divine origin of Christianity or not.

A great number of foreigners, particularly from Great Britain and Ireland, and from some of the German states, annually settle in the United States of North America; and it is now alleged that by their numbers they materially affect the elections. It is also alleged that many of them are very ignorant, and for want of previous education and proper habits are incompetent to exercise the functions of an American citizen. It is further alleged that a great many of them are Roman Catholics, who are under a sort of obedience to a foreign prince, the Pope of Rome, and hostile to the principles of the American constitution. For these and other like reasons it is now proposed that a longer term of probation than five years should be required of aliens before they are admitted to the franchise; and a party which calls itself the American Republican party would make the period of probation twenty-one years, as above stated. It is admitted in the argument of their party that if foreigners on settling in the United States are not allowed to have the franchise during the period of probation, they are during that period subjects to the citizens of the United States and not American citizens; which is consistent with what Aristotle says (*Pol.* iii. 1). If the period of probation is extended to twenty-one years, the citizens of the United States will have among them a great number of subjects—a great number of persons who will be as much their subjects as the people of Prussia are the subjects of the king of Prussia. The period of twenty-one years will, as above observed, comprehend the whole life of the great body of immigrants, and this body will be very numerous. The immigrants will enjoy no more privileges than aliens can enjoy in most countries of Europe, but they will have before their eyes the daily spectacle of a large number of citizens who do enjoy rights which they do not. Whether all these circumstances will render the government of so large a body of subjects an easier thing to deal with than the difficulties that are alleged to grow out of the present terms on which the citizenship is given, remains to be seen. The declared hostility of the American Republican party to the Roman Catholic religion, the religion of a great number of the immigrants, is calculated to embitter these immigrants still more if they are deprived of the power of attaining the citizenship. The United States already possess a great number of slaves who are subjects, and a large body of free coloured people who are looked upon as a different caste. To these a party now proposes to add a large body of alien subjects, to add to the elements of discord one element more; and that a more powerful element than all the rest. Undoubtedly the great amount of immigration into the United States is not a pure advantage to that country, but the call for different terms of naturalization seems to proceed more from party and religious feeling than to be founded on sober reflection; such at least is the conclusion to be derived from some of the manifestoes of those who call for a change in the naturalization laws. If we consider the measures proposed, the reasons given for them, and the temper with which they are urged, we must agree with the party which urges them, that the American nation has rapidly grown up 'without political experience adequate to govern their own mighty physical power.'

CLA'DIUM (from κλάδος, a branch or twig), a genus of plants belonging to the natural order Cyperaceæ. It has 1-2-flowered spikelets, 5 or 6 glumes, the lower ones empty and smaller, bristles absent, the nut with a thick fleshy coat, tipped with the slender base of the style. There is but one *European species* of this genus, the *C. Mariscus*, Common
Sedge. It has lateral and terminal repeatedly co
panicles, the spikelets capitate, the stem roundish,
smooth; the leaves rough on the margins and keel.
not a common plant in Great Britain, except in Cam
shire, where in the bogs and fens of that county it is
ingly common, hundreds of acres being covered entirel
it. It is used in many districts of Cambridgeshire
purpose of lighting fires. This plant is the *Schœnus*
cus and *Cladium Germanicum* of many botanists.
species of Cladium are natives of New Holland.

(Babington, *British Bot.*; Burnett, *Outlines.*)

CLADOCO'RA, a fossil genus of corals allied to
dendron, and occurring in the Palæozoic strata.

CLA'DODUS, a genus of fossil Placoid fishes, fr
mountain limestone of Armagh, Bristol, &c. (Agassiz

CLADO'NIA, a genus of plants belonging to the
order Lichenes. It has a thallus somewhat shrubby, br
rarely simple, leafy, with scales, which are often evan
branches cartilaginous, rigid, fistulose, all attenuated and
late, divided, fertile, generally perforated in the axils.
sessile, orbicular, convex, capituliform, not bordered, fi
the circumference, free beneath in the centre, the
reflexed, uniform within. The genus Cladonia thus d
with Scyphophorus and Pycnothelia, are included by A
and Delisle in the genus Cenomyce. Sir W. H
observes of this genus, that 'the determination of the
is attended with the greatest difficulty, on account of
variable character; and in the present state of my know
I dare not venture upon introducing others than those
lished in English Botany. Much attention has been gi
this genus by Delisle in the 'Botanicum Gallicum,' who,
Acharius, unites this and the two following genera in
Cenomyce, and enumerates 53 species, besides many
varieties, as natives of France; all of which are most pr
natives also of Britain. He would render an acceptabl
vice to British Botany who should undertake a monogr
the British Cladonieæ.' Hooker enumerates only five B
species.

C. rangiferina, Rein-Deer Moss, has erect, elon
roughish, cylindrical, greenish-white, very much bra
podetia, the axils perforated, the branches scattered,
intricate divaricated, the alternate ones drooping, ap
subglobose, brown, on small erect branchlets. This is
quent plant in Great Britain, on moors, heaths, and
tains. Its botanical characters are very variable,
especially the colour and the length of the ramific
This may be accounted for by the wide range of latit
which it is found, extending from the arctic regions, wh
is most abundant, to the tropics. This plant is the pr
support of the rein-deer in its native countries, and hen
common name. In Lapland there is no plant so abund
this, especially in the pine forests, where it covers the
of the soil for many miles together like snow. On the de
tion of the forests by fire this plant continues to grow
then reaches its greatest luxuriance. In such distric
rein-deer are principally pastured in the winter, and wh
may be the depth of snow, these animals are enabled to
their food by grubbing with their noses through the
It would be quite impossible that the rein-deer should
in these climates during the winter, were it not for t
parently insignificant plant. The Laplanders are also
habit of collecting this lichen with rakes in the rainy
when it is flexible, and readily separates from the
where it has grown; they then lay it up in heaps, to s
fodder for their cows. Dr. Clarke and his companions,
his travels in Lapland, were tempted to eat some of this
'To our surprise,' he says, 'we found that we might e
with as much ease as of the heart of a fine lettuce. It
like wheat bran. But after swallowing it there remained
throat and upon the palate a gentle heat or sense of burn
if a small quantity of pepper had been mixed with the
We had no doubt that, if we could have procured oil an
gar, it would have made a grateful salad. Cooling and j
it was to the palate, it nevertheless warmed the stomach
swallowed, and cannot fail of proving a gratifying ar
food to man or beast during the dry winter of the frigi
Yet neither Laplanders nor Swedes eat of this lichen.'
might arise from the fact which Dr. Clarke relates shortl
namely, 'that when Gustavus III. succeeded to the thr
edict was published and sent all over Sweden, recomm
the use of this lichen to the peasants in time of dearth
they were advised to boil it in milk.' Such an edict wa
likely to have the effect of preventing people from ea

ld from that time forth be only looked upon as a last
Dillenius however states, that when boiled in
yields no jelly, its substance is very little diminished,
mes drier than before; and the decoction evaporated
ly a small quantity of an acerb and austere extract.
entary secretion of this plant appears to be similar to
her lichens. It is called Lichenin [Lichenin, P. C.],
ins the same elements as starch. No nitrogen has
ected. It is however probable that nitrogen will be
exist in this lichen, as during the winter it supplies
deer with food which must require a nitrogenous
d, in order to maintain its muscular power, unless we
ourse to the supposition that starch or Lichenin, by
th free nitrogen in the system, can be converted into
other proteinaceous compounds.

micularis, Vermicelli Lichen, has its podetia spread-
zontally, pure white subulate, simple or slightly
, branches tapering at each end. It has been found
quent on the loftiest mountains of the North of Eng-
Scotland. The shape of its branches give it the
e of a bundle of small worms, or of vermicelli. It
e of South America, where it is used as a stomachic
name of *Contrayerba blanca*.

guinea has a leafy, very thick, imbricated thallus,
nd frosted with white beneath; above, green and
gelatinous; the lobes crenulated ascending, podetia
id, cavernous, split into fingered lobes, either wholly
r apex only; the shields marginal, confluent, scarlet.
ty form is a native of the Brazils, where it is rubbed
h sugar and water, and is found to be an excellent
or aphthæ in children. The remaining described
ecies are C. uncialis, C. pungens, C. furcata.

ey, *Flora Medica*; Burnett, *Outlines of Botany*;
British Flora, vol. ii.)

YODON, a generic title for some fossil reptiles
the new red-sandstone system. [Thecodonts, P. C.]

RON, CLAIRE JOSEPHE LEYRIS DE LA
a celebrated French actress, whose name frequently
the literary memoirs and correspondence of her day,
near Condé, in French Flanders, in 1723. She made
appearances in the Flemish theatres, and those of the
ring provinces of France. In 1732 she was called
risian Opera, and soon afterwards to the Comédie
. Although her name is now seldom mentioned,
fame is almost forgotten, no actress of any age or
ppears to have been the object of a reputation so
an admiration so intense. No one can read the
Voltaire and his contemporaries, or the memoirs of
el and others, without being struck by the frequent
e of her name, associated with enthusiastic eulogies.
evidently a woman of vicious morals, yet she was
unbending in public; and Voltaire, who had ob-
ives for esteeming her, from her successful repre-
of several of his characters, speaks of her in his
' as a person moving in so high and select a circle,
boast of having met her in society is put into the
an obscure braggart addicted to telling extravagant
The prevailing character of her acting was the
nd in this she was distinguished from her rival, Du-
ho was considered the representative of art. Ma-
e Clairon quitted the Comédie Française in 1765.
for many years as mistress of the Margrave of
, and died in 1803. Some memoirs relating to her
ted in 1799 by her pupil Mlle. Raucourt; and there
anecdotes of her in the memoirs of the Margravine
ch, and the 'Mémoires de Fleury' (the actor).

E HALL, CAMBRIDGE, was established on
f a former college called University Hall, which had
ded in 1326 by Dr. Richard Badew, who was after-
ancellor of the university. University Hall was
by fire in 1342, and was rebuilt, chiefly through
tations and exertions of Dr. Badew, by Elizabeth de
ne of the sisters and coheirs of Gilbert, earl of Clare.
college was called Clare Hall, and she endowed it
ith lands for the maintenance of a master, ten fel-
ten scholars, the liberal-minded lady stating in the
ndowment her motives to have been 'a desire for the
of every branch of useful learning, that there might
r remain an excuse for ignorance, and to create a
cord and closer union among mankind by the civiliz-
of indulgence in liberal study.'
the fellowships on the old foundation, which are
e senior fellowships, three others were founded by the Earl of Exeter in 1612, two by John Freeman, Esq., in 1622, and four from the estates bequeathed to the college by Joseph Diggons, Esq., in 1658. These nine fellowships are called the junior fellowships, but have nearly the same privileges annexed to them as to those on the original foundation.

The nineteen fellowships are open to all persons who may be bachelors of arts, or of a degree higher. The electors are the master and senior and junior fellows, and when the numbers are equal on both sides the master has a casting vote: the elections must take place within ten weeks and three days after a fellowship has become vacant. The master is elected by the fellows within ten days after a vacancy has occurred, and he must be a bachelor or doctor in divinity.

All the senior fellows must profess the faculty of divinity, except two, who, with consent of the master and majority of the fellows, may profess law and physic. Six of the senior fellows must be in priest's orders. Seven of the junior fellows of a certain standing must take priests' orders, but two of the fellowships may be held by laymen.

There are, besides the nineteen senior and junior fellows, three bye-fellowships, of which one was founded by Mr. Borage, in 1637, for persons of his own name and kindred, or, in default, a Norfolk man; and two by Mr. Philpot, in 1717, for natives of Kent. These three fellows must take priest's orders within seven years after they become bachelors of arts. They have no voice in college business, can hold no college office, and are incapable of being elected into any other fellowship.

There are four scholarships of 50*l*. a year each, and four of 20*l*. a year each, besides a weekly allowance in the butteries of 3*s*. 3*d*. a week each during residence. There are also, founded by private benefactors, one scholarship of 20*l*. a year, tenable till M.A.; two of a guinea a week during residence; one of 12*s*. a week during residence; one of 40*l*. a year; and upwards of thirty other scholarships and exhibitions, varying in value from 2*s*. to. 6*s*. a week, with allowances in the butteries during residence. The scholarships are open to natives of all parts of the kingdom, except four, two of which are from Wakefield school, one from Hull school, and one open to natives of Hertfordshire only.

There is an annual prize of 10*l*. for the best dissertation on the character of King William III., established by Mr. Greaves, of Fulbourn. Two silver cups of the value of 6*l*. each are given annually, one for regularity of conduct, the other for general learning. There are also awarded annual prizes of books, besides prizes of money not exceeding 40*l*.

There are 16 benefices in the gift of Clare Hall, namely, 2 in Cambridgeshire, 1 in Essex, 1 in Hertfordshire, 3 in Huntingdonshire, 1 in Lincolnshire, 1 in Norfolk, 3 in Suffolk, 2 in Surrey, 1 in Wiltshire, and 1 in Yorkshire.

Clare Hall is beautifully situated on the bank of the Cam, over which it has a stone bridge, leading to a vista between two rows of lime-trees. The buildings occupy a quadrangular court, 150 feet by 111 feet. Clare Hall was rebuilt in its present form in 1638; it is entirely of Ketton freestone, which looks remarkably fresh. The front looking towards the Cam is over-crowded with pilasters of the Ionic and Tuscan orders, and the forms and mouldings of the windows are not handsome, but the general effect is pleasing. The hall is a fine room, 69 feet by 21 feet. The modern library is also a large and well-proportioned room, well filled with valuable books, and the old library contains a good collection of Italian and Spanish books.

The old chapel of Clare Hall was built in 1535, previous to which the members attended divine service in the south aisle of St. Edward's church, which belonged to the college. The old chapel was never consecrated, and no one was ever buried there. The new chapel was begun in 1763, and consecrated in 1769. It is of the Corinthian order, the ornaments are appropriate, the stucco-work of the ceiling is highly finished, and the wainscoting neat. The cupola of the ante-chapel produces a fine effect. The design of the whole chapel was by Dr. James Burroughs, master of Caius College.

Among the eminent men who have been members of Clare Hall may be mentioned Archbishop Tillotson, Dr. Cudworth, and Ruggle, one of the fellows, author of the Latin burlesque comedy of 'Ignoramus,' written in ridicule of the barbarous phraseology of the lawyers, which was twice acted before James I., by members of the University, to his majesty's great amusement.

(Dyer, *History of the University of Cambridge*; Lysons, *Cambridgeshire*; Wilson, *Memorabilia Cantabrigiæ*; *Cambridge University Calendar*, 1845.)

CLASSIFICATION OF PLANTS. [Endogens, P. C.; Exogens, P. C.; Jussieu, P. C.]

CLATHRA'RIA, a genus of fossil plants found in the Wealden strata of Sussex by Dr. Mantell. The stem is reticulated on the surface, and has analogies to Xanthorrhœa and the Cycadeæ. Clathraria Lyellii and Cl. Mantelli (this latter the fruit) are described by Brongniart, ('Hist. des Végét. Foss.').

CLATHRO'PTERIS, a remarkable genus of fossil ferns, the foliation of which is marked with quadrangular network of vessels—a rare circumstance in living ferns—such as Meniscium. Clathropteris meniscioides occurs in the mesozoic sandstone of Hör in Scania.

CLEANTHES (Κλεάνθης) was the successor of Zeno of Citium in the Stoic school, and was himself succeeded by his pupil Chrysippus. As Zeno died in B.C. 263 or 259, the period of Cleanthes is approximatively determined by that fact. [Zeno of Citium, P. C.] Cleanthes was a native of Assus in the Troad, and originally a boxer. He came to Athens with four drachmæ (about 3*s.*) in his pocket, and began to attend the lectures of Zeno. As he had to pay his teacher a small fee, and at the same time to gain his livelihood, he used to draw water for the gardens about Athens in the night and also grind corn. There is a story that he was brought before the Areopagus in order to show what his means of subsistence were, and he proved that he was an honest man by producing as witnesses the gardener and the mealman for whom he worked, whereupon the Areopagus voted him a present of ten minæ, which however Zeno would not allow him to receive. Ten minæ seems rather a large sum for the Areopagus to vote on such occasion; and it is not said whether they had a fund for remunerating persons who were brought before them on groundless charges. Cleanthes attended the lessons of Zeno for nineteen years. He was slow of comprehension, but very laborious, whence he got the name of the second Hercules. Though he did not learn quick, he kept what he got. He was a copious writer; a list of his numerous treatises is preserved by Diogenes Laertius. Nothing is known of his works, except that we may collect that he indulged in the subtleties of discussion; but it does not appear that he did much towards the extension or improvement of the Stoic doctrines; that was done by his pupil Chrysippus: but the stern character of Cleanthes was well adapted to give stability to the doctrines of Zeno. The story of his death is characteristic. He had a swelling in his jaw, and at the advice of physicians he abstained from food, and the complaint began to abate. The physicians told him that he might now take his usual food, but he remarked that he had already gone a good part of the journey, and so he continued fasting till he died, at the age of eighty, or of ninety-nine, according to Lucian and Valerius Maximus.

Cleanthes is the author of a hymn to Jupiter in Greek hexameters, which was first published by Fulvius Ursinus, at the end of the 'Fragments of the Nine Illustrious Women and of the Lyric Poets,' Antwerp, 1568, 8vo. It is printed in Cudworth's 'Intellectual System,' with a Latin poetical version by Duport. The last edition is by Coraes, in his edition of the 'Enchiridion of Epictetus,' Paris, 1826, 8vo.

The hymn of Cleanthes has always been a favourite with Christian philosophers, but the true understanding of it, as Ritter remarks, can only be reached by looking at it from the Stoical point of view.

(Diogenes Laertius, *Cleanthes*; Fabricius, *Biblioth. Græc.* iii. 550; Ritter, *Geschichte der Philosophie*, iii. 521.)

CLEAVAGE, a term employed in geology to indicate a peculiar fossility in certain (especially argillaceous) rocks, which is independent of, and generally meets at a considerable angle, the surfaces of lamination or deposition. Clay slate furnishes the best examples of this phenomenon, which is discussed under the title Slate, P. C.

CLEO'ME, a genus of plants belonging to the natural order Capparideæ. It has a calyx of four almost equal spreading sepals; four petals; a torus somewhat hemispherical; six, rarely four, stamens; a silique dehiscent, stipitate, or sessile within the calyx.

C. gigantea is a shrubby plant, velvety-pubescent and somewhat clammy; the leaves 7-foliate, with 30 or 40 veins on each side of each leaflet. It has whitish-green flowers, with pinkish filaments and yellow anthers. It is a native of South America. It is a beautiful plant, but has a disagreeable odour and an acrid taste.

[illegible] an herbaceous unarmed smooth plant, with [illegible]; the lower and floral ones terrate, the uppermost ones ovate sessile; the silique smooth, the len
stipes. This plant has beautifully rose-coloured flo
is a native of Rio Janeiro.

There are about fifty species of the genus Cleome
many of them are now referred to the genus
[Polanisia, P. C. S.] Most of them are worth
on account of their beauty. The shrubby species
a rich light soil. They may be propagated by rip
tings in a moderate heat under a hand-glass, or by se
seeds of the annual species should be sown on a
spring, and when the young plants are of sufficient
may be planted out in the open border, but not
middle of May. The biennial species must be k
stove; they may be propagated by cuttings, as th
species.

(Don, *Gardener's Dictionary*.)

CLERC, SEBASTIEN LE, a very celebrat
designer and etcher, highly praised by the Fren
was born at Metz in 1637. His father, who wa
goldsmith, instructed him in the rudiments of dra
engraving.

Sebastien Le Clerc commenced his career as a
military engineer; but, having met with some unj
ment, he resigned a place which he held under th
de la Ferté, and determined in 1665 to settle in Pari
by the advice of Le Brun, he devoted himself exc
engraving or etching, an art for which he showed th
ability. He had also a fertile invention, and great
a designer.

In 1668 Le Clerc published a 'Géométrie Pra
eighty plates, which procured him the notice of
who gave him an appointment in the Gobelins
manufactory, with apartments in the factory, and
of 3000 francs. Whilst in this situation he ma
daughter of Vander Kerkhove, the dyer of the estab
by whom he had sixteen children; and his family
so rapidly that he was forced to give up his situatio
try his fortune by working for the public at large
1684 he was elected a member of the Royal Ac
Painting, and appointed Professor of Perspective,
which he held for thirty years. In 1693 he was
Engraver in Ordinary to the King (Louis XIV.)
was created about the same time a Knight, by Pope
XI. He used to sign himself Chevalier Romain.
Paris in 1714.

Le Clerc's etchings and engravings are very
They are said to exceed 3000; and his designs are
numerous. His works include nearly all subject
shipping. His master-pieces are, the Academy of
and Sciences, the Entrance of Alexander the Great
bylon, and the Feeding of the Five Thousand, from
compositions. A complete list of his works, prece
memoir, was published at Paris in 1774, by C. A. de
entitled 'Catalogue Raisonné de l'Œuvre de Seb.
Heineken also has given a long list of his principal
his 'Dictionnaire des Artistes,' &c. Le Clerc was
of several scientific works. He published a 'Trait
métrie,' a 'Nouveau Systême du Monde,' a 'Systé
Vision,' and a 'Traité d'Architecture.'

Sebastien le Clerc, his son, was a good historica
He was elected a member of the Royal Academy in
died in 1767, aged eighty-three. Several of his
have been engraved.

CLERK OF ASSIZE is an officer attached to
cuit, who accompanies the judges at the assizes, and
all the ministerial acts of the court. He issues
orders, writs, and other processes; draws indictmen
discharges, and respites recognizances; files informat
davits, and other instruments, enters every nolle
records all the proceedings of the court, and enters
ments. He is associated with the judges in the co
to take assizes; and he is restrained by statute 33 H
c. 24, from being counsel for any person on his cir
is paid by fees which are charged upon the several
performed by him, some, by virtue of established
others, under various statutes, 55 Geo. III. c. 56; 7
c. 64; 7 & 8 Geo. IV. c. 28; 11 Geo. IV.; and 1
c. 58. The fees payable on each circuit will be
Parl. Paper, No. 631 of 1843.

(*Parl. Paper*, 1843, No. 631; Wood's *Institutes*

CLERK IN ORDERS. [Clergy, P. C.]

CLERK OF THE CROWN IN CHANCE
officer of the crown in attendance upon both House

id upon the great seal. In the House of Lords he
and issues all writs of summons to peers, writs for
ance of the judges, commissions to summon and
'arliament, and to pass bills; and he attends at the
e House to read the titles of bills whenever the
t is given to them, either by the queen in person
nission. He receives and has the custody of the
the representative peers of Scotland, and certifies
e House; and makes out and issues writs for the
representative peers of Ireland and their writs of
He is the registrar of the Lord High Steward's
tate trials and for the trial of peers; and he is also
f the Coronation Court of Claims.

exion with the House of Commons, he makes out
all writs for the election of members in Great
ose for Ireland being issued by the clerk of the
reland); gives notice thereof to the secretary-at-
act 8 Geo. II. c. 30, for the removal of troops
ace of election; receives and retains the custody of
to Parliament for the United Kingdom; notifies
in the 'London Gazette,' registers it in the books
, and certifies it to the House. By act 6 & 7 Vict.
s the custody of all poll-books taken at elections,
ired to register them, to give office copies or an
of them to all parties applying, and to prove them
tion committees. He attends all election commit-
e returns of members; and when a return is to be
consequence of the determination of an election
he attends at the table of the House to amend it.

officer of the lord high chancellor, not in his judi-
, but as holding the great seal; and in this de-
e makes out all patents, commissions, warrants,
ts, or other instruments that pass the great seal,
nts for inventions and other patents and charters
passed in the Patent Office. He also administers
office to the lord chancellor, the judges, the ser-
, and all other law officers, and records the same
s of his office. For these several duties he receives
1000*l.* a-year, under 7 & 8 Vict. c. 77.

eport, No. 455, *of Session* 1844.)

e of the Clerk of the Crown is commonly called
Office; but there is also an office in the Court of
nch called the Crown side of the Court, of which
aster and other officers.

OF THE HOUSE OF COMMONS, the
of that House, is appointed by the crown for life,
patent. Upon entering office he is sworn before
ancellor 'to make true entries, remembrances, and
the things done and passed in the House of Com-
hich duties he is aided by the clerk-assistant and
k-assistant. These three officers are more com-
n as 'clerks at the table.' The chief clerk signs
f the House, endorses the bills, and reads whatever
to be read in the proceedings of the House. He
nsible for the execution of all the official business
se, which is under his superintendence. In the
styled 'Under Clerk of the Parliaments to attend
ommons;' whence it is inferred that on the sepa-
e two Houses, the under-clerk of the Parliaments
the Commons, leaving the clerk of the Parliaments
er House. His salary is 3500*l.* a year, that of the
nt 2500*l.*, and that of the second clerk-assistant
t under act 4 & 5 Wm. IV. c. 70, the salaries of
t offices will be reduced to 2000*l.* and 1500*l.* re-
on the first vacancy.

Precedents, vol. ii. p. 251; May, *Proceedings
of Parliament*, p. 157 and Index.)

OF THE PARLIAMENTS is the chief minis-
of the House of Lords. His duties (which are
the clerk-assistant and additional clerk-assistant)
minutes of all the proceedings, orders, and judg-
e House; to sign all orders, to endorse bills, to
sses at the bar, to wait upon the queen when she
e the royal assent to bills, and to take her com-
them; and to signify the royal assent in all cases,
en by the queen in person or by commission. He
occasionally with a master in chancery as a mes-
the Lords to the Commons in the absence of
ter. Besides these and other special duties, he is
h the general superintendence of the official esta-
f the House of Lords. He is paid out of the
Fund, of which no account is ever given.

roceedings and Usage of Parliament.)

CLERK OF THE PEACE is an officer attached to every county or division of a county, city, borough, or other place in which quarter-sessions are held; being the ministerial officer of the court of quarter-sessions. He is appointed by the *Custos Rotulorum* of the county, and holds his appointment so long as he shall well demean himself. In case of misbehaviour the justices in sessions, on receiving a complaint in writing, may suspend or discharge him, after an examination and proof thereof openly in the sessions; in which case the *Custos Rotulorum* is required to appoint another person residing within the county or division. In case of his refusal or neglect to make this appointment, before the next general quarter-sessions, the justices in sessions may appoint a clerk of the peace. (1 Wm. III. c. 21, § 6.) The *Custos Rotulorum* may not sell the office or take any bond or assurance to receive any reward, directly or indirectly, for the appointment, on pain of both himself and the Clerk of the Peace being disabled from holding their respective offices, and forfeiting double the value of the consideration, to any one who shall sue them. (Id. § 8.) To give effect to this provision, before the Clerk of the Peace enters upon the execution of his duties he takes an oath that he has not paid anything for his nomination.

The Clerk of the Peace may execute the duties of his office either personally, or by a sufficient deputy approved by the Custos Rotulorum. He or his deputy must be constantly in attendance upon the court of quarter sessions. He gives notice of its being holden or adjourned; issues its various processes; records its proceedings; and performs all the ministerial acts required to give effect to its decisions. During the sitting of the court, he reads all acts directed to be read in sessions; calls the jurors, and parties under recognizance; presents the bills to the grand jury and receives them again; arraigns prisoners, administers oaths, and receives and records verdicts. Whenever prosecutors decline any other professional assistance, he is required to draw bills of indictment, for which, in cases of felony, he can charge 2*s.* only, but in cases of misdemeanor he may charge any reasonable amount for his service.

In addition to these general duties he has other special duties imposed upon him by different statutes, in regard to the summoning of juries, the appointment of sheriffs and under-sheriffs, the enrolment of rules of savings' banks and friendly societies, the custody of documents required to be deposited with him under standing orders of the Houses of Parliament, and other matters.

By act 22 Geo. II. c. 46, § 14, he is restrained, as being an officer of the Court, from acting as a solicitor, attorney or agent, or suing out any process, at any general or quarter sessions, to be held in the county, &c. in which he shall execute his office.

The Clerk of the Peace is paid by fees. Those chargeable upon prisoners acquitted were abolished by the 55 Geo. III. c. 50, for which he is indemnified by the county. By the 57 Geo. III. c. 91, the justices of the peace for the county are authorized to settle a table of fees, to be approved by the Judges of assize, which may not be exceeded by the Clerk of the Peace, under a penalty of 5*l.* If he take more than is authorized by such table of fees, he will also be liable to be proceeded against at common law for extortion, and to be removed from his office by the court of quarter sessions. The sessions cannot, however, compel the payment of these fees by summary process, nor detain the parties until they be paid, but the Clerk of the Peace is left to his remedy by action. A bill is now before parliament, by which Clerks of the Peace are in future to be remunerated by salaries, payable out of the fees collected.

(Dickinson, *Quarter-Sessions;* Burn, *Justice of the Peace.*)

CLERKS AND SERVANTS. [SERVANTS, P. C.]

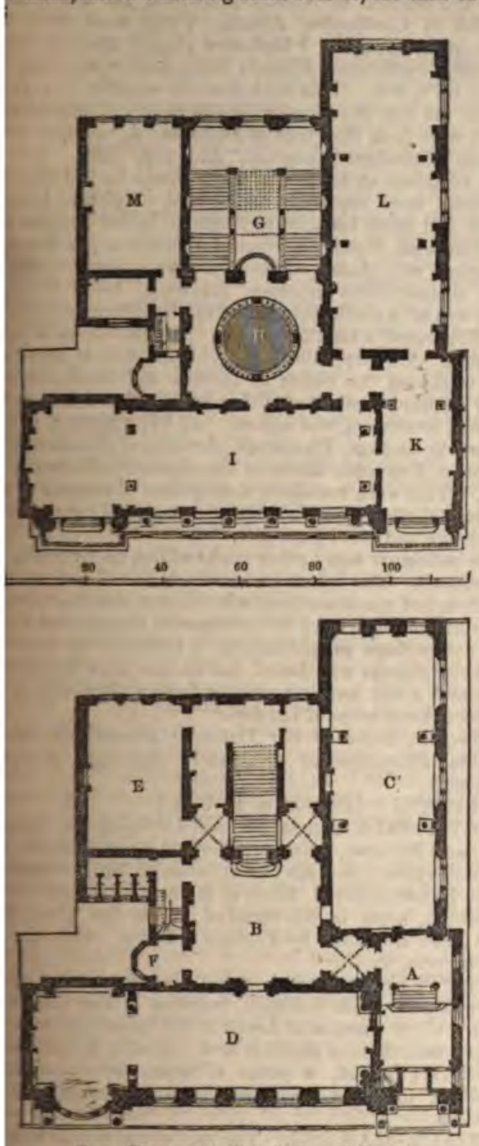
CLEVELAND, CLEIVELAND, or CLEAVELAND, JOHN, was born in Leicestershire in 1613, and studied at Cambridge, where he became a college-tutor and reader in rhetoric. On the breaking out of the civil war he joined the royal army, and distinguished himself both as an active soldier, and as one of the most severe and biting writers of lampoons on the roundheads. He died in London, in 1658. Those few verses of his, chiefly love-poems, which rise above personalities and temporary interests, possess occasional richness of fancy; but they are deformed by the most perverse conceits anywhere to be found in the circle of that which has been called the metaphysical poetry of the seventeenth century. The most complete edition of Cleveland's works appeared in 8vo. in 1687.

CLUB-HOUSE. As now constituted, the clubs of the metropolis form a peculiar feature in our modern social condition. Unlike the literary and other clubs of the last century, consisting of a comparatively few individuals who held their meetings at stated times, and generally at some tavern, with no apartments of their own, the clubs of the present day—most of them established within the last thirty years—are more upon the footing of what used before to be called Subscription Houses (such as Brookes' and White's)—merely places of rendezvous always open to those who are members of them, and who are subject to no other forms and rules than the being balloted for upon admission. That, in fact, is almost the only thing in their constitution which distinguishes them from public hotels and coffee-rooms, except it be that the accommodations are upon a much more extensive scale, and in a very superior style, yet at the same time at the minimum of cost, owing both to the number of members and the consequent great certain revenue derived from the annual subscriptions alone, and to there being no profit to be made out of what is expended and consumed. To the original character of coffee-room and news-room the modern clubs add that of library and reading-room, and are furnished not only with card, billiard, and smoking rooms, but with baths also. The cuisine and domestic department are equally complete: in short, luxurious refinement is studied throughout; the whole is upon a scale that may be called princely, and would be deemed quite extravagant for a private establishment, except that of a few of our wealthiest noblemen. But the seeming extravagance is only individual economy, because what it would cost each member singly to furnish an ordinary sitting-room is, when clubbed together by a thousand or fifteen hundred persons, sufficient to erect a sumptuous palace. Accordingly, the club-houses—the later-erected ones at least, constitute a new class of buildings in the metropolis, being almost the only ones which answer to the character of *palazzi*—palatial structures, plainly distinguishable from public buildings either for business or amusement. While, too, they eclipse in external appearance almost every town mansion of our nobility, they are upon a far more spacious scale internally, because, except for the domestic part of the establishment, no other apartments are required than what in a private mansion would be called the state and reception rooms,—no bed-chamber floor, and perhaps even second one, over the first floor. The rooms themselves are besides greatly more spacious and lofty than in private town-houses of the very first class, except one or two, such as Mr. Hope's, Stafford House, and Grosvenor House, which have a single room or 'gallery' rivalling in extent a club-house drawing-room. With the exception of the picture-gallery, even the state-rooms in Buckingham-palace are of moderate size in comparison with some of those in the Reform and Conservative Clubhouses, and certainly not more striking in character.

Clubhouses may therefore well be considered a class by themselves—distinct from all other edifices, public and private alike, and from the latter not merely as being larger or more ornate as to design, for that may not in every instance be the case, but for carrying with them an expression not to be counterfeited by clubbing two or three houses together, and uniting them into a single façade, which, however decorated, betrays itself at a glance for what it really is, and the more extensive it is, the more danger of its looking very barrack-like instead of palatial. However they may differ as to design in other respects, with a single exception (the Reform) the clubhouses resemble each other in one particular—in showing only two ranges of windows in their façades,—those of the ground-floor, and of the *piano nobile* or principal floor; a circumstance highly favourable to composition, whether astylar or columnar, and productive of an air of dignity which cannot possibly be obtained by piling up story over story to make a lofty house with comparatively low and moderate sized rooms. Concomitant with the greatness of manner arising from only two ranges of windows, is the other which is derived from *fenestration*, or the spacing of the windows, there being often not more than a single window to every twelve feet or upwards of frontage. What, besides, contributes in no small degree to architectural finish and completeness of design in those instances where it has been adopted, as in the Travellers' and Reform Clubhouses, is the plan of entirely screening out the areas and lower part of the building by means of parapet and balustrading, which, while it effectually conceals what is not intended to be seen, even where it is allowed to be seen, is highly ornamental in itself. In most of the principal clubhouses the basement is exceedingly deep, nearly one-half of the structure being below g
in addition to the lowermost or kitchen floor, co
multiplicity of rooms for various domestic purposes,
mezzanine over it and immediately beneath the gr
fitted up with baths and dressing-rooms for member
also are placed the rooms for the housekeeper and o
intendents of the respective departments. A gre
habitable space is also got out of the upper part of
in such a manner as not to interfere at all with th
design: a modern clubhouse, in short, affords a
architectural study of every contrivance for conve
comfort, and for the systematic management of a
mestic establishment.

Notwithstanding that the London Clubhouses hav
many points in common, they differ considerably as
tectural pretension and merit. The University (fi
in 1826), the Union (1827), and the United Servi
are tolerably characteristic of their respective
Wilkins, Smirke, and Nash. The Athenæum,
(opened Nov. 1830), corresponds in its general ma
United Service, the two buildings occupying th
angles of Carlton Place next Pall-Mall; yet th
degree of uniformity is kept up between them, they
in contradiction to each other as regards style and
entablature of Burton's building being as remarkab
was then quite an extraordinary degree of impo
richness, as that of Nash's for its utter insignifican
now the Athenæum continues to be the only examp
of continuous sculptural decoration in a deep bas-
carried along the whole exterior of the edifice. I
Athenæum seems to have furnished the hint for th
design introduced immediately afterwards (1831) b
the adjoining Travellers' Clubhouse, viz. astylar co
crowned by a bold and rich *cornicione*, and in whic
are treated as principal features. It was that clubho
first brought Barry into notice, and stamped his re
an architect of superior taste: its carefully finished
and simplicity of design combined with richness of
hailed as welcome novelty after the dull blankn
pseudo-Greek school, and of Palladianism with mer
the walls for windows. Yet happy as was the app
it, the style then brought forward by Barry was so
being original, that the Pall-Mall front of the
is, we will not say a plagiarism from, but a tastefu
proved version of the façade of the Palazzo Pa
Florence, as is strikingly evident on comparing i
latter in Famin's 'Architecture Tocane,' a work
familiar, it may be presumed, to every professi
It was in the other front of the Travellers' t
displayed his originality and produced a most
and graceful composition, one which he has n
surpassed or even equalled in that style. Owi
situation, towards the garden, that front is all
withdrawn from public view, for though the buildin
visible, all its beauties of detail are completely l
tunately the Travellers' has been made the subject o
tectural monograph, which supplies a series of adm
graved illustrations, comprising not only plans, elev
sections, but plates of the ornamental details, intern
as external. No less fortunately the elevation of t
front there shows it in its original state, previous to
marred by an excrescence now built upon its roof,
the purpose of a smoking-room. The Reform Club
the same architect) was erected 1839-41, immediat
ing the preceding, and forms together with that of
næum a rich architectural group and *insula*, extend
300 feet back and front, by 105 in depth. It
that while Barry's first clubhouse was spoken of
thing altogether original, his second should have b
to be little more than an express copy of the Palazz
at Rome, though the difference is much greater tha
of resemblance, and the only point of similarity in
structures are crowned by a massive cornicione,
windows decorated with columns. The Reform
a fine unbroken and uniform mass, all the three fr
alike, some slight differences of detail excepted.
considerably loftier than the two adjacent buildings,
additional story, not a mere mezzanine one in
though the windows are of little more than mezz
portions. This floor forms quite a distinct part of th
with a separate entrance to it from the street, and
in private chambers to members of the club. T
apartments of the Reform are far more spacious and

those in any other clubhouse of previous date: the hall or saloon is a very striking and scenic apartment, ying the entire height of the ground floor and principal nd lighted through the cove of its ceiling, which is perd and filled in with cut glass. The coffee-room on the d floor, and the drawing-room over it, are each 117 feet



Plan—Conservative Club, St. James's Street.

d Floor.—A, Entrance Hall, 35×19, 19 high. B, Inner Hall, 35×35, C, Coffee Room, 80×28.6', ditto. D, Morning Room, 92×26.6', E, House Dining Room, 36×23. F, Waiting Room.
r Floor.—G, Grand Staircase, 35×36. H, Upper Vestibule, 35×35. ing or Drawing Room, 92×26.6', 25 high. K, Card Room, 14×19. ary, 80×28.6', 25 high. M, Committee Room, 36×23.

xt to the Reform, though separated from it by an ap- to Carlton Gardens, the Carlton Clubhouse, erected hat earlier than the other, by Sir R. Smirke, presents a orcible contrast to it, showing how very little can be of affectedly pure Greek in astylar composition. That of architecture will probably soon disappear, it being led to rebuild and greatly extend the front by adding to two adjoining houses. The new building, it is said, e in the Elizabethan or Cinquecento style. The clubhouse in Pall-Mall, the United University, was rather earlier than the Reform (1836-7), by Sir R. e and his brother Sydney Smirke, in a style to which eems to have contributed his respective share, it being which Greek and Italian elements are shaken up to- rather than combined with each other. The interior s nothing whatever of interest. The new Conservative ouse in St. James's (by Basevi and S. Smirke, 1843-4, Feb. 1845), is not only the latest, but in some re- the most splendid of all the edifices of the kind. The shows a return to the Palladian fashion of an order raised upon a ground-floor basement; and in regard to the order itself, Corinthian, the design is perfectly satisfactory; the entablature and ornamental sculpture beneath it, between the capitals of the columns and pilasters, give an air of nobleness and richness to the upper part; whereas the basement floor is in very meagre taste, more French than Palladian; and there is so little unity of character, between the upper and lower division, that they seem to be the distinct work of the respective architects. But it is for its interior and its decorations that this clubhouse rivals the Reform, and perhaps throws it a little into the shade: the central hall, staircase, upper hall or saloon, drawing-room, and card-room, are all gorgeously embellished with polychromic encaustic painting, by Sang, the same artist who was employed at the Royal Exchange. Being the first instance of such decoration here, it has attracted much notice, and is certainly a very striking novelty, but not particularly satisfactory after the first impression wears away. The effect would have been much better, if colour had been applied more sparingly to the lower hall and staircase, and the full display of it been reserved for the two evening rooms. In that case the other apartments would not have looked so plain and bare as they now do in comparison with the hall, which raises expectation too highly. The annexed plans of the two principal floors of this building will not only describe it more clearly and briefly than we could do, but also serve to give an idea of the accommodation required in buildings of the kind.

CLU'SIA, a genus of plants belonging to the natural order Guttiferæ, named after Charles de l'Ecluse, or Clusius, one of the most celebrated botanists of the sixteenth century. [Clusius, Carolus, P. C. S.] It has a calyx of four imbricate, coloured, permanent sepals, the outer ones smallest, usually doubly bracteate at the base; the corolla of 4-6 deciduous petals; the stamens numerous and free in the male flowers; few, sterile, and connected in the female flowers; the style absent; the stigmas 5-12, radiately peltate, sessile, permanent; the flowers usually polygamous; the ovary surrounded by a short staminiferous nectary; the capsule fleshy, 5-12-celled, opening by valves from the top to the base, with a dissepiment in the middle of each valve; the placenta thick, triangular, central; the seeds eggshaped, surrounded by pulp, suspended from the inner angle of the cells; the embryo straight, inverted; the cotyledons separable. This definition includes the genus *Quapoya* of Aublet. The species are trees and shrubs, usually parasitical, and yielding a viscid resinous juice, of a balsamic flavour; hence they are called in England balsam-trees.

C. rosea, Rose-flowered Balsam-tree, has polygamous flowers, a rose-coloured 5-6-sepaled calyx; the tops of the dense nectaries awl-shaped; 8-12 stigmas; the leaves obovate, obtuse, veinless, sometimes emarginate, on short striated petioles. It is a native of the Carolinas and St. Domingo, and other parts of tropical America. The fruit is green, and of the size of an apple, with eight lines running like the meridians of a globe: when it ripens it opens at these lines, disclosing its scarlet seeds lying in the midst of a pulpy mucilaginous matter, similar to the pomegranate. The whole tree is very handsome, but few fruits offer so beautiful a piece of mechanism. 'It grows on rocks, and frequently on the trunks and limbs of trees, occasioned by birds scattering or voiding the seeds, which, being glutinous, like those of the mistletoe, take root in the same manner; but the roots, not finding sufficient nutriment, spread on the surface of the tree till they find a decayed hole or other lodgment wherein is some small portion of soil: the fertility of this being exhausted, a root is discharged out of the hole till it reaches the ground, where it fixes itself, and the stem becomes a large tree.' (Loudon.) The resin collected from this plant is used as an external application in veterinary medicine, and also is employed for covering boats instead of tallow and pitch.

C. alba has hermaphrodite flowers, a many-leaved calyx; corolla with 5-8 petals; tops of nectaries retuse, or with 5-10 short stamens; stigmas 5-6; leaves like the preceding, but not emarginate. An elegant tree, native of South America, and epiphytical on larger trees. The trunk is frequently a foot in diameter. It abounds in a balsamic juice of a green colour, which becomes brown on being exposed to the air. The fruit is scarlet, and contains its seeds embedded in a scarlet pulp. Birds are very fond of the seeds, and pluck them out of the fruit while hanging on the tree. The Caribbees use the juice for painting the outside of their boats. The flowers are white, but not handsome.

C. Quapoya has stalked diœcious flowers; the calyx of 5 or 6 sepals; the corolla of 5 or 6 yellow petals; the nectary short, 4-5-lobed; stigmas 5; fruits globose; leaves obovate, acute. It is a native of the woods of Guiana, where it is called *Quapoy*. It is a climbing shrub with yellow flowers, and when cut into yields a white transparent juice. *C. panapanari* is a similar plant, yielding a yellow juice. *C. flava* is a tree closely resembling *C. alba*.

All the species grow well in a light sandy loam, and cuttings root freely in sand under a hand-glass in heat. The pots in which the plants are grown require to be well drained with potsherds.

(Don, *Gardener's Dictionary*; Loudon, *Encyclopædia of Plants*.)

CLU'SIUS, CA'ROLUS, or DE L'ECLUSE, or DE LE CLUSE, CHARLES, was born at Antwerp on the 18th of February, 1526, according to Sprengel, 1525. He commenced his education at Ghent, and from thence was removed to Louvain with the object of studying the law. He studied here for about two years, and then went to Marburg, where he became disgusted with the law, and pursued the study of philosophy. During this period he acquired a love for the study of plants, and devoted much of his leisure to this pursuit. At Marburg he formed a friendship with Hyperius, who inspired him with an admiration of Melanchthon, and in 1549 he left Marburg for the purpose of studying at Wittemberg. From Wittemberg he proceeded to Strassburg, and from thence to Montpelier. At Montpelier he became the pupil of Rondelet, and devoted himself to the study of medicine and took his degree of doctor of medicine. He resided for three years at Montpelier, and then proceeded to Paris, where he remained for two years, but was compelled to leave on account of a civil war which broke out at that period. From this time he visited most of the countries of Europe for the purpose of adding to his botanical knowledge. In 1564 he travelled through Germany, from thence he went with Fuggers to Spain, and afterwards visited Portugal. In 1751 he returned to Belgium, and again visited Paris, from whence he went to England, where he remained some time, being much interested with the results of the voyages of Sir Francis Drake and other British sailors. He returned to Antwerp in 1573. Here he occupied himself with publishing the result of his botanical labours. He was invited by the Emperor Maximilian II. to become curator of the botanical garden at Vienna. This office he accepted, and he remained there till 1587, when, through the influence of court intrigue, he was obliged to retire. He then lived at Frankfort in a state of perfect obscurity till, in 1593, in the sixty-eighth year of his age, he was called to the chair of botany at Leyden. This position he held for sixteen years, and died on the 4th of April, 1609.

Few men have suffered more in following a favourite pursuit than Clusius. He has on this account been called 'The Martyr of Botany.' As early as his twenty-fourth year, by excessive fatigue, he contracted a dropsical disease, which it is said his tutor Rondelet cured with chicory. At the age of thirty-nine he broke his right thigh during one of his botanical rambles, and a short time after his right arm. Whilst at Vienna, he dislocated his left ancle, and eight years after this accident he dislocated his right hip. For this he was treated unskilfully, and ever after was obliged to use crutches for his support. The want of exercise in one who had habituated himself to so much brought on other diseases, the most distressing of which was stone in the bladder. During his exertions in the early part of his life, he also contracted a hernia, which troubled him to the end of his days. But his bodily infirmities never diminished his mental activity, and he continued teaching and writing to the very last. His works are very numerous, for he not only published original descriptions of new plants, but he translated into Latin works from the French, Spanish, and Portuguese, and from the Latin into French, thus rendering a most important service in the diffusion of a knowledge of the plants that were known in his day.

The following are his principal works:—1, 'Histoire des Plantes, en laquelle est contenue la Description entière des Herbes, leurs espèces, formes, noms, temperamens, vertus, et
tions,' Antwerp, 1557, folio. This was a translation of
by Dodoens, to which Clusius appended a chapter of
on gums, liquors, woods, fruits, and aromatic roots.
idotarium Florentinum,' Antwerp, 1561, 8vo. This
anslation of an Italian work containing an account of
tines used by the Greek, Arabian, and Florentine
s. 3, 'Aromatum et Simplicium aliquot Medicamentorum apud Indos nascentium Historia,' Antw
8vo. This work went through many editions, and
nally a translation of a Portuguese book by Garcias
to which Clusius appended many notes and wood
also translated into Latin two works of the same ki
from the Spanish of Nicolas Monardes, the othe
Spanish of Christopher Acosta. These were p
Antwerp in 1574. 4, 'Rariorum aliquot Stirpiu
paniam observaturam Historia libris duobus expr
werp, 1576, 8vo. This work was the result of hi
Spain. It was illustrated with 229 figures of plan
which were from the works of Dodoens. 5, 'Aliqu
Garciæ Aromatum Historiam,' Antwerp, 1582.
work contained an account of many things he had
England, more especially an account of plants,
which had been brought to England by Sir Fran
6, 'Rariorum aliquot Stirpium et Plantarum per
Austriam, et vicinas quasdam Provincias observata
toria quatuor libris expressa,' Antwerp, 1582, 8
work was of a similar character to the Flora of
was illustrated with 358 plates. 7, 'Rariorum
Historia,' Antwerp, 1601, folio. This was a u
two works on the plants of Austria and Spain,
many additions from then living botanists, as Penn
Plateau, Dortmann, and others. 8, 'Exoticorum
quibus Animalium, Plantarum, Aromatum aliorum
grinorum Fructuum Historiæ describuntur,' Antwe
folio. This work contained descriptions of animals
plants, and other objects of interest, which had been
by himself and other travellers.

He published many other works of less importan
translations. The industry with which he collated t
of others and combined them with his own observatio
his works of importance for reference at the present
was not perhaps so philosophic a naturalist as hi
poraries Dodoens and Lobel, but he was more labo
exercised a not less important influence than eith
botanical knowledge of his day.

(Bischoff, *Lehrbuch der Botanik*; *Biographie*
Loudon, *Encyclopædia of Plants*; Adanson, *F*
Plantes.)

CLUTCH. [Coupling, P. C. S.]

CLYME'NIA, a group of fossil Cephalopoda, t
by Count Münster, who has described a considerab
of species from some calcareous bands in the Palæo
of the Fichtelgebirge. Some of these, with several
all seven), occur in the strata of Devon and Corn
have been described by Profesor Phillips. See t
Goniatites, P. C.

CLY'PEUS, the generic name given by Klein
to a group of fossil Echinida, frequent in the ooli
tions. Clyp. sinuatus of Leske is the largest Britis
Clyp. clunicularis of Smith is now ranked as a Nucl

CNEMI'DIUM, a genus of Spongiadæ, pro
Goldfuss, for some fossils usually ranked as Man
Siphonia.

COACH-MAKING. The mechanical details i
the manufacture of a coach or other vehicle depend
peculiarity which they present, rather on the choice
bination of materials than on the actual working
There are however a few points which merit attenti
to materials and to processes.

The timber employed in coach-building comp
beech, elm, oak, mahogany, cedar, deal, pine, fu
wood, and birch. Mr. Adams ('Treatise on Ple
riages') gives the reasons for the selection among th
of wood, according to the purpose to which it is to b
The timber most employed is English-grown a
'hedge-row' ash, growing in open spots, is of slow
but is much firmer, stronger, and tougher than t
'coppice,' and is therefore preferred to it for m
heavy framework of a carriage. Ash is rather a
fibrous than an elastic wood, and is well calculated t
concussions to which the supporting framework of
exposed; it is best fitted for use when arrived at ma
before it has attained its extreme size; it is sometim
the heart, sometimes red, and the former is best fit
purpose in view; it is sometimes so wrinkled in
scarcely to be planed smooth, and is then in its
state; it acquires by steaming or boiling a plastic
which enables it to be bent to a form suited for
timbers. These various qualities, together with th
of any tendency to twist or warp, render ash better f

kind of timber for the skeleton framework of a

a timber used only in building carriages of an in-
, since it cannot well bear alternation of air and
Elm is used largely for strong planking. Of the
'hedge-row' elm is more employed than 'wych'
elm. The grain of this wood is curly and wavy,
work, brittle, and apt to split; but when once
to workable form, elm possesses great strength, es-
the naves of wheels. *Oak* is not employed to any
e extent in coach-building: it forms the spokes of
HEEL, P. C.], and is used in some cases as a thin
or 'wainscot.' *Mahogany* is chiefly in request for
e panels or broad plain surfaces of the body of a
the use of this kind of wood there is a difference
e cabinet-maker and the coach-builder: the former
panish' mahogany, on account of the beautiful
a which gives such diversity of light and shade:
e latter employs 'Honduras' mahogany, because
grain of the Spanish prevents it from being bent into
ires required in coach-making. Honduras wood
ured in planks four feet in width, perfectly straight-
d free from knots and blemishes, and is therefore a
ber well fitted for bending. *Cedar*, of considerable
having a coarse grain, is sometimes used instead of
for coach-panels, when they are to be covered with
is too porous to receive a painted surface. *Deal*
for the flooring of carriages, and also for panels
o be covered; wide American pine, cut into very
, is used for the roofing. *Fustic*, a hard yellow
ned from Central and South America, is sometimes
or the naves of wheels which are intended for hot
being less liable to shrink than English timber.
, a yellow, close, straight-grained, elastic but brittle
formerly much used for the straight shafts of car-
when curved shafts became general, the employ-
s wood for the purpose lessened. American *birch*
ed for flat boarding, on account of its great width,
neous substance, its freedom from rents, the small-
pores, its ready yielding to the plane, and the non-
of the grain when painted; it is however brittle,
be bent like mahogany for panels. Sycamore,
nd plane-wood, are occasionally used as substitutes
the above-mentioned woods.
ng up these varieties of timber, tools and processes
ed similar to those witnessed in many other trades.
place, a 'mould' of the coach-body is prepared
ttern, as in the earlier stage of ship-building; that
es of wood are cut out so as to give the size, form,
ures of all the separate parts of the coach; and
ards act as guides in cutting and shaping the tim-
orking-operations are of two wholly distinct kinds,
by different sets of workmen: one relates to the
the other to the framework or 'carriage;' the
ending more upon delicacy, and the latter upon
In bending thin pieces of timber to form curved
wood is wetted on the side which is to be convex,
on that which is to be concave: the unequal ex-
the two surfaces gives the curvature, and it is the
business to secure this curved form when once ob-
ith a few exceptions, the processes connected with
making may be regarded as very similar to those
naking.
aking of the carriage which supports the body, the
are so few in number that the plane is scarcely
after the saw, the chief cutting-instrument is a
esembling a spoke-shave. The complexity of the
and the number of pieces which compose it, de-
deal on the circumstance whether the carriage
eels or only two, and whether drawn by one or
In the Dennet and the Stanhope, two-wheeled
wn each by one horse, there is very little under-
n the Tilbury and the Cabriolet, pliable leathern
ntroduced between the springs and the body of the
ll these four have shafts; but in the Curricle, a
d vehicle for two horses, there are no shafts: the
pended on a frame consisting of two side-pieces
ss-bars at each end; a pole inserted in this frame
een the horses, and serves to yoke them to the
Where there are four wheels, the under-framing is
icated, since the wheels have to be connected one
r, and also with the body. In some vehicles of
here are elliptical springs beneath the body and the axle; while in others, besides these springs, there are pliable leathern braces to connect the body with the under-framework; in which case the framework which supports the fore and hind springs is connected together by a long central piece of timber called the *perch*. Occasionally this perch is made of iron, and is bent into a form called the 'crane-neck,' as a means of enabling the coach to be turned more readily in a narrow street. The general class of four-wheeled carriages for two horses, such as the coach and the chariot, have double sets of springs: viz. horizontal springs immediately on the axles, to support the carriage and to intercept the concussion; and circular upright springs to sustain the body. If made close, such carriages comprise the varieties of the Coach and the Chariot; if to open occasionally, the Landau and the Landaulet; if to remain permanently open with a leathern hood or head, the Barouche and the Barouchet; and a modification of this latter kind, the Britzscha (Adams, p. 85). All these varieties of form render necessary corresponding changes in the formation of the framework beneath. The form and nature of the springs above alluded to are described in SPRINGS, P. C.

The arrangements of the under parts of the mechanism depend a good deal on the facilities afforded for turning the coach. In a four-wheeled carriage there is an axle connecting the two fore-wheels, and another connecting the two hind-wheels; and if these two axles were so fixed as to remain constantly parallel, the carriage could not turn. In practice, the front axle is made to turn upon a pivot, and the wheels connected with it are made small enough to go under the framework of the carriage during the act of turning. It is for this reason, and this alone, that the front wheels are made smaller than the hinder ones; and as a great disadvantage in draught is thereby occasioned, various contrivances have been adopted for rendering the use of somewhat larger wheels practicable. Sometimes the body of the carriage is raised to a greater height; sometimes a portion of the under part of the body is cut away, to leave room for the turning of the wheel. It was as a means of remedying these inconveniences that Mr. Adams proposed a few years ago the 'aequirotal' construction of carriages. As the inequality in the sizes of the fore and hind wheels is adopted solely as a means of enabling the vehicle to be turned round, Mr. Adams sought for some mode of enabling this turning to be effected even when all the four wheels are of equal size. This he does by having the carriage so divided in the middle as to turn upon a pivot; or rather, the pivot, or perch-bolt, which in a common carriage is placed immediately between the two front wheels, is on the aequirotal principle placed much farther back; by which the fore-wheels have so large a radius in turning that they do not touch the body, and may therefore be made of equal size with the hinder wheels. The mode of adjusting this pivot depends upon the kind of carriage. In a phaeton, which is an open four-wheeled carriage with two seats, the front one higher than the lower, the hinder half of the body is hinged to the front half. In a chariot or a coach, the coach-box is connected with the framework of the front-wheels, and the body with that of the hind-wheels, and there is a pivot which connects the two halves together.

The axles of a carriage form an important part of the manufacture, since they are the medium of communication from the wheels to the body. When this part of the mechanism was made wholly of wood, its general designation was 'axle-tree;' but iron is now more extensively used, and the name 'axle' is given to it. Formerly the axle was made to evolve with the wheels, but now the wheels are generally made to revolve on and not with the axle. There are three parts in the axle; the 'arms,' which pass into the naves of the two wheels, and the 'bed' or central part, which connects the two arms. The adjustment at the nave or centre of the wheel requires very careful management; and it is to this point that Collinge's 'patent axle' chiefly relates. In earlier modes of construction a ring was put within the hollow of the nave, and the end of the arm of the axle worked within this ring; an arrangement which was intended to prevent the too rapid wear of the wood by the friction of the axle. In the present practice however the axles are fitted with iron boxes adjusted to the arms. To lessen the friction arising from the two surfaces working together, black-lead, soap, grease, or oil, are used; and it is partly on account of the ingenious way in which this lubrication with oil is effected that Collinge's 'patent axle' is so much employed. Besides the mechanism for connecting the axle with the wheel, there is contained a little cup for holding oil; and as the wheel rolls along, this oil is pumped or drawn out of its receptacle, and made to lubricate the adjacent surface.

In a well-finished coach, the *leathering* and the *painting* are among the more important processes after the wood and iron work are completed. The former of these is somewhat remarkable. In the common kinds of vehicles the wood and iron are coated with paint laid on to a considerable thickness; but for the better kinds, leather is applied to the roof, and the upper part of the back, front, and sides, previous to the process of painting. A singular example is here shown of the pliability of leather; for one hide, without seam, knot, or joining, is made to cover the whole. 'The hide, which is of a large size and sound quality, is first thoroughly moistened throughout and thrown over the top of the coach, the edges hanging down on all sides. The currier then rubs or presses it down all over the roof, until it lies close and even in every part. He next proceeds to one of the sides, and in like manner rubs and scrapes the leather till all irregularities disappear. The leather is in that soft and pliable state that it will yield to the movement of the tools, and enable the workman to fit it to every part of the coach with perfect closeness. A little consideration must show that a superfluous fold of leather will occur at each corner; yet by working it towards a central point at the back or front, the currier succeeds in erasing or pressing out all irregularities, and in producing a surface sufficiently flat and smooth for the subsequent operations of the painter. The division between the upper and lower portions of a coach is usually covered by beading of some kind or other, and the leather is trimmed or cut to this line of division.' Penny Magazine, No. 625.

A coach receives a far thicker coating of paint than the wood-work of a house, since it could not else admit of the very high polish to which it owes so much of its beauty. The principal plain surfaces, such as the doors and panels, receive ten, twelve, or even fifteen distinct coatings, each one thoroughly dried before the next is applied; and at intermediate times all the roughnesses derived from the paint are smoothed down by pumice-stone, rotten-stone, and other like substances. The paint, which is formed from nearly the same materials as that used for house-painting, viz., mineral colours, linseed oil, and turpentine, is of a white colour for the earlier coats, a yellowish tint for those next applied, and depends for its tint in the later coatings on the taste of the maker. All these several coatings being dried and smoothed, the surfaces receive six or eight applications of copal varnish; and it is the subsequent polishing of this varnish which imparts the smooth, lustrous, and beautiful appearance to the panels and plain surfaces.

The number of coach-makers (in all branches) in Great Britain in 1841 was 12,603, of whom 11,668 were in England, 93 in Wales, 801 in Scotland, and 41 in the islands of the British seas.

COAL-MINING AND COAL-TRADE. Since the publication of COAL and MINING, P. C., several Reports made by Government Commissioners have afforded valuable information concerning coal-mining, in reference both to the amount and distribution of the coal raised, and to the relation between the miners and their employers.

From one of these reports (*Parliamentary Papers*, 1843, vol. xiii. p. civ.) the following is stated to be the condition of the collieries on the Tyne, Wear, and Tees, as ascertained on the 5th of March, 1843. The colliery proprietorships are ranged under four classes, according to the scale of the operations. The 1st class comprises four great concerns, headed respectively by the Marquis of Londonderry, the Earl of Durham, Lord Ravensworth, and the Hetton Coal Company. The capital sunk in each of these concerns is supposed to be not less than half a million sterling; they each comprise from six to twelve separate mines, and all the necessary engines, waggons, horses, &c.; and they are believed to realize a profit on an average from 35,000*l.* to 45,000*l.* per year each. The 2nd class comprises companies or partnerships whose sunk capital ranges from one to two hundred thousand pounds. The 3rd class includes those concerns which have only a single pit each, and whose capitals are from forty to sixty thousand pounds. The 4th class, humbler but more numerous than any of the others, comprise those which have a capital ranging from eight to thirty thousand pounds. The first three of these classes agree to that uniformity of price which constitutes the 'Limitation of the Vends,' before explained in COAL, P. C., p. 297. The 4th class are generally engaged in the coasting-trade, and for the supply of steam-coal to London and the local manufactorie than, and distinct from all these, are several conc chiefly engage in land sale, and do not enter t markets.

In Durham there are more persons employed un in coal-mines than in cultivating the surface.

Statistical tables are given, in the report above concerning the force and amount of operations at th Omitting the items, the sum totals may be here gi

Collieries on the Tyne, Wear, and Tees, March

	On the Tyne.	On the Wear an
No. of collieries . . .	41	29
No. of pits	92	100
Average depth, in fathoms . .	85	75
No. of men and boys employed	12,833	12,937 (in 2
Engine-power in pumping water	4,888 horses	9,707 (in 2
Engine-power in raising coals .	4,782	
Coal raised per annum . .	2,468,481 tons	2,355,486 (from
Highest price at that date .	10*s.* 1¼*d.* per ton	11*s.* 6*d.* per
Lowest price at that date .	7*s.* 1*d.* ,,	8*s.* 6*d.* ,,

The same report gives an explanation of the di system observable in the collieries of the norther and those of the Midland districts. In these latter, in South Staffordshire, the 'Butty' system is c acted on. This consists in the miners being the not of the proprietor or lessee of a colliery, but tractor called a 'butty,' who engages with the pro the mine to deliver the coal at so much the ton; labourers himself, using his own horses, and supplyi tools necessary for working the mines. These butti general been working miners, who, by the accum some little capital, or by the assistance of relation abled to engage a pit, with or without partnership persons, and to enter into a bond to raise the coal price per ton. 'The butty,' says Mr. Tancred, th sioner who prepared the report, 'has become the or task-master, and the pit's company his hired from whom it is his interest to squeeze out as much any and all means as circumstances will allow. Th property, who possesses the royalty, sinks the pits, the machinery, and whose position therefore in soci ensure in general humane and liberal treatment of his is by the intervention of a butty entirely disconne them; he neither hires nor dismisses them from his hands the whole concern over, as far as the employm labouring classes is concerned, or any interest in the as his servants, to an inferior.' The miners entertai dislike to the 'butty' system, and many of the prop endeavouring to abolish it.

In the Northumberland and Durham district, th between the proprietors and the miners is more intimate. No middlemen or contractors are emplo overseers, viewers, and other intermediate officers by regular salaries; and the working colliers recei from the proprietors, once a fortnight, the amoun earnings. There is a bond or agreement between th differing from the 'butty' system of Staffordshire, from the 'tutwork and tribute' system of the Corni [MINING, P. C., p. 246.] This bond is annual, terms the miner is ensured a minimum amount of wa rally to the extent of seven or eight days per fortni the owners are bound to pay the men whether th working or not; beyond this minimum, whatever miners may do is paid for at a stipulated price. are paid for the quantity of coals raised—so much of 20 pecks. If the coal-owners wish to force up don prices by sending a deficient supply, they limit ing to the minimum quantity, which they are e to do by the terms of their agreement with the pit it is as a means of preventing this system of mo throwing the miners entirely out of work, (which occasionally do if unchecked) that the minimum established.

In the reports issued by the Commission for inqu 'Children's Employments,' published among the parl papers in 1842, are many details as to the sex and a persons employed in coal-mines. From these it ap females as well as males, and children as well as adul rather then were) so employed. The actual num not in every case be ascertained; but the relative p of young persons to adults, employed under-ground mines, were, in 1841, nearly as follow (*Parl. Pa* vol. xv. p. 38)—one thousand adult males being tak standard of comparison.

England.

	Adults.		13 to 18.		Under 13.		Proportion of young persons to 1000 adult males.	Proportion of young persons to the whole number.
	Males.	Females.	Males.	Females.	Males.	Females.		
hire	1000	..	227	..	180	..	407	two-sevenths
e	1000	..	240	..	167	..	407	two-sevenths
	1000	22	352	36	246	41	675	upwards of one-third
e	1000	86	352	79	195	27	653	upwards of one-third
ham.	1000	..	226	..	184	..	410	two-sevenths
erland rham	1000	..	266	..	186	..	452	nearly one-third

e west of Scotland the proportion of children and
ersons to adults was smaller than in England; in the
cotland it was larger; and in Wales it was about the
From the following table it appears that the employ-
females in coal-mines had extended much more largely
and than in England:—

rtion of Females to Males working in Coal-mines.

	Adults.	From 13 to 18.	Under 13.
hire	1 to 45	1 to 28	1 to 25
shire	1 to 12	1 to 13	1 to 37
othian	1 to 3	1 to 5½	1 to 20
othian	1 to 3	1 to 3½	1 to 10
Lothian	1 to 5	1 to 7	1 to 10
gshire	1 to 4½	1 to 8	1 to 10
mannanshire	1 to 5	1 to 5	1 to 11½
ire	1 to 5½	1 to 10	1 to 30
organshire	1 to 53	1 to 53	1 to 83
rokeshire	1 to 2½	1 to 8½	1 to 53

statements made in the reports above referred to,
ng the sex, age, and usual condition of the persons
ed in coal-mines excited (as is well known) great
n about three years ago, and led to the introduction of
which received the royal assent on August 10, 1842.
provision of this Act (5 & 6 Vict. c. 99) the follow-
nges were made:—

the time of passing the act, no female, other than
were so employed previously, was to work in any
colliery; and that after three months from that date,
ale under eighteen years old should be so employed;
female whatever after March 1, 1843. After this
ate, no males were to be employed under ten years of
No person to be apprenticed under ten years of age,
longer than eight years (except in the case of engine-
and others who are only occasionally at work under
). Where there are vertical or other shafts, no steam
engine to be intrusted to the care of a person under
e of fifteen; in the case of a windlass or gin worked
orse or other animal, the driver to be considered the
in charge. After three months from the passing of
, proprietors of mines or collieries not to pay workmen
ages at any tavern or public-house. To enforce the
nce of these regulations, the following arrangements
nade:—Inspectors of mines and collieries, appointed
Secretary of State for the Home Department, are em-
d to enter and examine any such works, and to report
ing them to the government; any proprietor violating
as to the age and duration of apprenticeship, is sub-
to a fine varying from 5*l*. to 10*l*.; parents or guardians
resenting the age of children so employed are fined
neglect of the clause as to the care of the shafts, and
that relating to the payment of wages, subjects the
r to fines varying from 5*l*. to 50*l*.

as found, as might have been expected, that many
persons were for a time thrown out of employment
his act came into operation; but the evils resulting
e former system were too great to be overlooked.

traffic in coals, as regards the London trade, the coast-
le, and the exports, was illustrated by a few tables in
TRADE, P. C., bringing down the details to 1835. A
ditional details reaching down to a date seven years
re here given.

Culm, and Cinders exported from the United Kingdom.

Years.	Tons.	Declared Value.
1835	736,060	£244,898
1836	916,868	332,861
1837	1,113,610	431,545
1838	1,313,709	485,950
1839	1,449,417	542,609
1840	1,606,313	576,519
1841	1,848,294	675,287
1842	1,999,504	734,000

Of the quantities exported in 1841 *and* 1842 *there were shipped from*

	1841.	1842.
Newcastle	750,585 tons	866,281 tons
Sunderland	408,515	364,886
Stockton	169,345	180,808
	1,328,445	1,411,975

being more than three-fourths of the entire quantity exported. Of this quantity there were exported to

	1841.	1842.
France	451,003 tons	515,975 tons
Germany	173,437	170,038
Holland	173,378	180,434
Denmark	151,146	145,286

being rather more than half the entire quantity exported.

Coals brought into the Port of London.

	Coastwise.	By Inland Navigation.	Total.
1840	2,566,899 tons	22,188 tons	2,589,087 tons
1841	2,909,144	33,594	2,942,738
1842	2,723,200	31,519	2,754,719

Coals shipped Coastwise from one port of the United Kingdom to another.

	1841.	1842.
From Newcastle	2,397,977 tons	2,350,480 tons
Stockton	1,483,618	1,501,596
Sunderland	937,995	859,231
Newport	506,078	503,308
Swansea	450,119	471,241
Whitehaven & Maryport	451,370	442,638
38 others ports	1,422,742	1,720,975
	7,649,899	7,649,469

In 1835 the coal duties were repealed. Mr. M'Culloch, in the supplement to his 'Dictionary of Commerce,' published next after this change, says, 'We are glad to have to state that the duty on coal exported in English ships is repealed; and that the duty on all descriptions of coal exported in foreign ships is reduced to 4*s*. a ton. The increased exportation of coal this measure has occasioned cannot fail of being highly advantageous. Ships that might otherwise have had to go out in ballast, have now an opportunity of taking with them what may prove a profitable cargo, at the same time that the cost of conveying the mineral abroad operates as a premium in favour of our own manufacturers. The fact, too, that there is in South Wales alone a supply of coal sufficient to meet the present demand of the empire for more than 2000 years, shows the futility of imagining that the measure can be injurious by its hastening the exhaustion of the mines.' In 1842 however coal was again subjected to a duty, which on large coal exported in British ships amounted to 2*s*. per ton, and on coal and cinders exported in foreign ships not entitled to the privileges conferred by treaties of reciprocity, the duty was 4*s*. per ton. This duty gave a check to the rapidly increasing foreign trade in coal, which had trebled since 1835, encouraged the opening of foreign coal-mines, and produced only a comparatively trifling addition to the revenue. In 1845 the duty was repealed. This change took place in March. Two months afterwards another alteration was made of great importance: the regulations which the coal-owners of the north of England had acted upon since about 1771, and by which they regulated the supply of the London market, were abolished. The opening of this market to the coal-fields of the midland counties, by the extension of railways, probably led to this change.

The question respecting the available store of coal in this island has been lately much canvassed. Mr. T. Sopwith, in an Essay recently published (*The National Importance of Preserving Mining Records*, 1844), remarks, 'The opinion that our stores of coal are all but inexhaustible rests wholly on assumed data, and not upon an accurate and detailed statistical accounts, such as alone could warrant a confident opinion. This question will ere long become a subject of serious concern, unless some measures are taken to found our calculations on a solid basis. It an easy matter to assume that a considerable thickness of available coal extends over hundreds of square miles; but the different opinions formed by men of the highest respectability and talent, strongly prove how meagre and unsatisfactory are the only data on which their estimates are founded. It is not however the mere quantity of coal that is to be considered. Especial regard must be had to its quality, depth, thickness, extent, and position. Many of the inferior seams can only be worked in conjunction with those which, by their superior quality, repay the expense of working them at depths varying from three hundred to six hundred yards; and it may readily be conceived that inferior coal only could not be profitably raised from pits equal in depth to three or four times the height of St. Paul's Cathedral, unless the price of such inferior coal was raised to more than the present price of the best coal. . . . . It is not the exhaustion of mines, but the period at which they can be profitably worked, that merits earnest and immediate attention.' These remarks from a man who is well acquainted with the subject are worth more than the vague assertions made by some geologists and writers on statistics. In this as in other branches of industry we must not only consider the possible amount of supply, but also the price at which the thing can be brought to market.

Coal is one of the items included in the new Customs' Tariff of the present session (1845).

COBÆA'CEÆ, a small natural order of plants, separated by D. Don from Polemoniaceæ. It has a leafy 5-cleft equal calyx; an inferior campanulate regular 5-lobed corolla, imbricate in æstivation; five unequal stamens rising from the base of the corolla, with 2-celled compressed anthers; superior 3-celled ovary, surrounded by a fleshy annular hypogynous disk; the ovules several, ascending; simple style; trifid stigma; the fruit capsular, 3-celled, 3-valved, with a septicidal dehiscence; the placenta very large, 3-cornered in the axis, its angles touching the line of dehiscence of the pericarpium; the seeds flat, winged, imbricated in a double row, their integument mucilaginous, fleshy albumen, and a straight embryo; the cotyledons foliaceous; the radicle inferior. The species are climbing shrubs, with alternate pinnated leaves, the common petiole being converted into a tendril. G. Don observes that this order is readily distinguished from Bignoniaceæ and Pedalineæ by the flowers being regular and pentandrous, and in the presence of albumen in the seeds; and from Polemoniaceæ by habit and its winged seeds. Lindley places the genus Cobæa, which is the only one of the order, in Polemoniaceæ, and says 'the differences of importance between the one and the other appear to consist in the former having an unusually large lobed disk, a septicidal dehiscence, and climbing habit. Distinctions, I fear, of too little moment to be admitted as of ordinal value.'

There are two species of Cobæa, *C. scandens* and *C. lutea:* the former has large campanulate flowers, with a short tube of a dark dirty purple colour; the latter has yellowish flowers, about half the size of those of *C. scandens.* The *C. scandens* is a great favourite in our gardens, and is a rapid-growing and abundant-flowering climber. It will grow in the open air, in summer, and should be trained against a south wall, or against a house, when it flowers profusely. It is adapted for conservatories and greenhouses. It may be propagated by seeds or cuttings.

(Don, *Gardener's Dictionary;* Lindley, *Natural System.*)

COBALT PYRITES. [Cobalt.—*Arseniate of Cobalt,* P. C.]

COCCO'LOBA, a genus of plants belonging to the natural order Polygonaceæ. It has a 5-parted calyx, eventually becoming succulent; the filaments 5, inserted into the base of the calyx, and forming a short ring by their union; the styles 3; stigma simple; the nut 1-seeded, bony, covered with the succulent enlarged calyx; the embryo in the middle of the albumen.

C. uvifera, Sea-side Grape, has cordate, roundish, shining leaves. It is a tree twenty feet in height, with flexuose branches. The leaves are very beautiful, being of a full bright glossy green colour, with the principal nerves of a deep red. As the fruit advances to maturity it becomes surrounded by the succulent perianth, which forms an obovate reddish purple berry, not unlike a small pear. The nut in the inside is roundish, very acute, 3-lobed at the base, and attached by the centre. The embryo has foliaceous cotyledons. The leaves, wood, and bark of this plant are powerfully astringent, and a decoction of them is evaporated to form the substance called Jamaica kino. The astringency depends on the presence of tannin, but there is in addition present in the wood a red colouring-matter which is used as a dye. The wood is also valued for cabinet-work. The fruit is eatable, and is exposed for sale in the West Indian markets, but is not valued much. It is a native of the sea-coasts of most of the West Indian Islands and the adjoining shores of America. There are several other species of Coccoloba natives of the West Indies. They are all of them evergreen trees. They grow freely in a light loamy soil, and ripened cuttings taken off at the joint and placed under a hand-glass in a po
will root freely. They require a stove.

(Loudon, *Encyclopædia of Plants;* Lindley, *Fl*
dica.)

COCCONEIS. [Infusoria, Fossil, P. C. S.]

COCCO'STEUS, a genus of fossil fishes, with
culated scaly covering, from the old red-sandstone o
Cromarty, Caithness, and the Orkney Islands. (A

COCHIN, a town in Hindustan, on the wester
the peninsula, in 9° 51′ N. lat. and 76° 18′ E. lo
place where the first European settlement was
the East Indies. In 1503 the Portuguese fleet,
conduct of Alfonso and Francisco Albuquerque, obt
the sovereign of Cochin permission to erect a fort
in recompense for the assistance they had given
wars with the Zamorin of Calicut. The country in
bourhood being very fertile, the Portuguese carried
vantageous trade until the town was taken from the
Dutch in 1663. The trade continued to flourish
Dutch government, so that in the time of Stavori
than seventy years ago, it was for them what Bom
the English, the emporium of the western coast. I
ginning of the war between Holland and England, i
was taken possession of by the British, to whom it
ceded in 1814. Since this place has been in the ha
English its trade has considerably diminished, in s
many great advantages which the place possesses.

There is hardly any place in Hindustan excep
better situated for trade than Cochin. It is the best
presidency of Madras, and the only port for ship-bu
there are no places throughout the whole extent of t
coast which afford shelter to large vessels except B
Cochin. But its chief advantages as a place of tra
rived from the fertile country in its vicinity, and it
means of communication by water. In this part of
is found a very remarkable system of inland navigat
the Backwater. This is a lagoon of a peculiar descr
extends from Chowgaut (10° 40′) on the north
deran, the capital of Tranvancore (8° 30′) on the so
tance of one hundred and seventy or eighty miles,
minates within fifty miles of Cape Comorin. A c
of it is in progress of formation, and is in fact na
boats during the rains, from Chowgaut to Cotah, si
south of Tellicherry, a farther distance of about ni
The Backwater runs nearly parallel to the sea, so
the distance of a few hundred yards, at others of fo
miles. Its breadth varies from twelve and fourtee
two hundred yards; its depth from many fathoms to
Into this Backwater, as into a grand trunk, all the
charge their water, which descend from the mountai
farther east, and during the force of the monsoons t
of water is very great. There are six channels of
cation between the Backwater and the sea, but o
navigable for ships, and this is that on the south
of which the town of Cochin is built. There
at its mouth, but the depth of water on it is se
eighteen feet at high-water of spring-tides. Witho
there are no dangers. Though the coast of Malabar
cannot be approached by vessels during the south-
soon, the only month in the year in which the h
Cochin cannot be entered is perhaps July. The
without is good, and the gales during the south-wes
rarely blow with such violence as is experienced in t
in the harbour of Bombay. Within the bar, the
expands into a fine æstuary, three, four, and six m
at least twelve miles long, and deep enough for t
vessels. Country vessels of sixty or seventy tons' b
load and discharge at the water's edge, and ships at
length.

The country through which this water-communi
tends is not inferior in fertility and productions to a
Hindustan of equal extent. The narrow strip of lan
the Backwater and the sea is indeed sandy, but its lo
are thickly overgrown with coco-nut palms, which yie
quantity of fruit. The country east of the Backwat
and level along its banks, and produces rich crop
Farther inland it rises into low hills, partly covered
forest-trees and partly with grass; but the valleys
them are exceedingly fruitful, and produce in abund
of the best quality, all the numerous productions
the coast of Malabar is famous. This is evident
great number of valuable staples, such as cotton, h
pepper, ginger, turmeric, cardamoms, betel-nut, cop

ernels cut into slices and dried for exportation), ivory, dust, iron, and drugs. Indigo grows spontaneously, and ane, coffee, clove, nutmegs, pimento, and raw silk suc- very well. The hills are covered with forests. Timber l kinds, some more valued by the natives for maritime ses even than teak, and considered hardly inferior by peans, is to be had in unlimited abundance and at the t price. Much timber is sent to Bombay, but hardly essels are built at Cochin for European merchants. The m of Muskat however has perceived the value of this ur for ship-building, and most of his vessels have been there. There are also a few country vessels annually

The trade of this place, though it has much declined, ll considerable. Europeans rarely visit this port; but tive commerce is carried on between it and Bombay ntry vessels, especially in timber. The trade with a and the countries surrounding the Persian Gulf is important. As these countries have no forests, they ve from Cochin all the timber required for repairing different craft. Rice, coco-nuts, copra, and spices xported to them to a great extent. There is also some erce carried on with Singapore, to which place pepper other spices, with fish-maws, are exported for the Chi- market. In the vicinity of Cochin a number of Catholic Indian Christians are found, and also many Jews.

tavorinus, *Voyages to the East Indies*; Buchanan, *Jour- hrough Mysore, Canara, and Malabar*; and Brown, *On Natural Advantages of Cochin as a place of Trade*, in on Geog. Journal, vol. iii.)

OCHIN, CHARLES NICOLAS, called Cochin fils, ebrated French designer and etcher, was the son of C. Cochin the elder, and was born at Paris in 1715, and died e in 1788. His father, likewise an able engraver, was structor, and Cochin early displayed a peculiar aptness rt, and general quickness of ability. In 1749 he made a through Italy with the Marquis de Marigny, and in 1756 ished a critical account of the various works of Italian art, pecies of amateur's companion in a journey through Italy oyage Pittoresque d' Italie,' in 3 vols. 8vo. The work popular among his own countrymen: Cochin published d edition of it in 1773. Some years before the appear- of his 'Voyage Pittoresque' Cochin published an ac- of the antiquities of Herculaneum, 'Observations sur Antiquités d' Herculaneum, &c., par MM. Cochin et ard,' which went through two editions: the second con- many etchings of antient works of art and other objects iquity.

chin was knight of the order of St. Michel; keeper of Royal Collection of Drawings; and secretary to the Academy of Painting and Sculpture.

was one of the best and most productive of the h engravers; his prints amount to upwards of fifteen ed, comprising almost every variety of subject, from al designs, and from the works of other masters, chiefly h: among the best are the fourteen large etchings of ea-ports of Vernet. A 'Catalogue Détaillé' of his was published by Jombert in 1770, and copied by ken into his Dictionary, with the addition of some executed after 1770. The sixteen large prints made the drawings of Attiret and others, sent from China, h not engraved by Cochin, were executed under his ion. [Attiret, P. C. S.]

chin was the author of some other literary works besides already mentioned. He published in 1757, 'Reflexions Critique des Ouvrages Exposés au Louvre;' and 'Re- de quelques pièces concernant les Arts, avec une Dis- ion sur l'effet de la Lumière et des Ombres relativement à nture;' in 1763, 'Les Misotechnites aux Enfers;' and 5, 'Lettres sur les Vies de Slodtz et de Deshayes,' and et d'une Salle de Spectacle.'

eincken, *Dictionnaire des Artistes*, &c.; Huber, *Manuel mateurs*, &c.; *Biographie Universelle*.)

CHLEA'RIA (from *cochleare*, a spoon, the leaves of ecies being hollowed out like the bowl of a spoon), a of plants belonging to the natural order Cruciferæ, the ler Pleurorhizeæ, the tribe Alyssineæ. It has sessile globose or oblong silicles, with ventricose very convex , with a prominent dorsal nerve; many seeds not mar- ; the calyx equal at the base, spreading; the petals ; the stamens toothless. The species are annual or nial herbs, usually smooth and fleshy, but sometimes cent. The flowers are mostly white.

e of the most common species of this genus, as formerly defined, is the common Horse-radish (*Cochlearia Armoracia*). This species however is now referred by some botanists to a new genus, *Armoracia*, and is described by Babington, in his 'Manual of British Botany,' as *A. rusticana*. The genus Armoracia differs from Cochlearia in its globose pouches or silicles being destitute of a prominent dorsal nerve. The Horse-radish, though described in books on British Botany, can scarcely be considered a native of Great Britain, as the wild specimens are evidently escapes from gardens. For the medical properties of Horse-radish see Cochlearia Armoracia, P. C. S.

C. officinalis, common Scurvy-Grass, has the radical leaves cordate, reniform, stalked; the stem leaves sessile, oblong-sinuate, half-embracing the stem; the pouch globose or ovate. It is a native of Great Britain, in muddy places near the sea-coast. This plant varies much in size, and two or three varieties have been described. The *C. grœnlandica* of Smith and Withering appears to be nothing more than a diminutive variety of this species. In France the Scurvy-grass is called *Cranson officinal*; in Germany *Löffelkraut*. When fresh it has a peculiar smell and a bitter acrid taste, which are quite lost by drying. The fresh plant is a stimulant, and possesses the antiscorbutic virtues of the whole order. It has however a peculiar reputation in the disease called scurvy; hence its common name. It is sometimes used as a salad. When cultivated, the seeds should be sown in July, in drills eight inches apart, and when the plants are up they should be thinned to about six inches apart. Those plants which are taken out may be placed in new beds. They will all be fit for use in the following spring.

C. danica has the leaves all stalked, the radical ones cordate, somewhat lobed; the stem-leaves 3-5-lobed, subdeltoid uppermost, mostly shortly stalked; the pouch roundish, elliptical. It is found in Great Britain, in a few places on the sea-coast. It is a more abundant native of the sea coasts of the north of Europe, and is a native of Kamtchatka.

C. anglica, English Scurvy-Grass, has the radical leaves stalked, ovate-oblong, entire; the stem-leaves oblong, entire or toothed, mostly sessile, the upper ones embracing the stem; the pouch oval, oblong veined. It is a native of muddy sea-shores about the mouths of rivers, especially in Great Britain; but is found in Norway and Lapland, and other parts of Europe.

There are several other species of Cochlearia described; they are however most of them insignificant plants, inhabitants of northern climates. In their cultivation, the smaller perennial sorts do best in pots, but the larger ones may be grown in an open border in a moist situation. The annuals and the biennials are best propagated from seeds. The following directions for the cultivation of horse-radish, by Mr. J. Knight, are extracted from a paper in the first volume of the 'Horticultural Society's Transactions.' 'Horse-radish thrives best in deep, soft, sandy loam, that is not very dry in summer nor inundated in winter; the situation must be open. During winter trench the ground three feet deep, and in the following February procure the sets, in the choice of which take the strongest crowns or leading buds, cutting them about two inches long. Mark out the ground, four feet beds, and one foot alleys, then take from the first bed nine inches of the top soil, laying it upon the adjoining bed, after which take out an opening at one end of the bed, in the common way of trenching, 15 inches deep from the present surface, then level the bottom, upon which plant a row of sets across the bed at nine inches apart each way, with their crowns upright; afterwards dig the next trench the same width and depth, turning the earth into the first trench over the row of sets, thus proceeding trench after trench to the end for as many beds as are wanted. The plant must be kept clear of weeds during summer, and as soon as the leaves decay in autumn, let them be carefully raked off with a wooden toothed rake; in the following February, eighteen inches of the earth of the unplanted bed must be laid as light as possible and equally over the beds that are planted, then trench and plant the vacant beds as before directed. The following autumn the first planted horse-radish may be then taken up by opening a trench at one end of the bed to the bottom of the roots, so that the sticks or roots of horse-radish may be taken up entire and sound, which for size and quality will be such as have not been seen. The following February, the one-year-old crop will require additional earth as before directed, which must of course be taken from those beds which are now vacant, which, when done, if the ground appears poor or unlikely to produce another vigorous crop, they must have a coat of manure. Upon every alternate bed, which is not planted, a dwarf annual crop may be grown, such as spinnach or radishes.'

(Don, *Gardener's Dictionary*; Babington, *Manual of British Botany*; Loudon, *Encyclopædia of Plants*.)

COCHLE'ARIA ARMORA'CIA, *Medical Properties of*.—Horse-radish is a cruciferous perennial herbaceous plant, growing in Alpine meadows, and along the banks of rivers, as well as on the sea-coast in the south and south-eastern parts of Europe. The root is the officinal part, and is always obtained from cultivated plants, as it is enjoined to be used in a fresh state. The root is solid, fleshy, tapering, from one to two feet long, and when bruised or scraped into shreds, emits a highly acrid penetrating odour, which causes a secretion of tears when received by the eyes: put in contact with the skin, it speedily causes rubefaction. The taste is more or less acrid, according to the season of the year or the age of the plant; young plants possess much mucilaginous starchy and saccharine matter, by which the pungency is lessened.

The analysis by Gutzet shows its composition to be acrid and very volatile oil, bitter resin, extractine, sugar, gum, starch, woody fibre, vegetable albumen, acetic acid, with acetate and sulphate of lime. A little sulphur is stated to exist in it. The volatile oil is the active principle. This is of a pale yellow colour, heavier than water, and so volatile that a single drop of it can fill a large room with a penetrating odour of horse-radish. In this respect it resembles the volatile oil of mustard. The taste is at first sweetish, afterwards burning and acrid. It has a sensible effect on the brain. When applied to the skin, it causes violent inflammation and rubefaction. [Sinapi, P. C.] It is sparingly soluble in water; freely in alcohol. The outward application of horse-radish causes vesication; the internal application causes sensible warmth of the stomach, with augmented power of digestion. A warm infusion excites vomiting, in the same way as mustard does. This kind of emetic is useful to rouse the stomach from the insensibility consequent on narcotic poisons being taken, but it must not be forgotten that violent or even fatal inflammation of the stomach may ensue if vomiting do not occur, and the stomach-pump is a more certain means of emptying that viscus.

Horse-radish is well known as a condiment taken with beef, fish, and other kinds of food difficult of digestion. Its powers are heightened by associating it with vinegar, as in the horse-radish sauce.

The officinal preparations are the Infusum Armoraciæ Comp. This, when made with boiling water as ordered in the Pharmacopœia, soon spoils, notwithstanding that some compound spirit of horse-radish is added to it. It would be much more advantageous to make it with cold water, especially as its power depends upon a principle of such remarkable volatility. The compound spirit is employed as an adjunct to diuretic and other medicines. Horse-radish scraped down into shreds and digested in red wine forms a vinum armoraciæ, which is eminently useful in warding off a relapse of intermittent fever, when the employment of it is persevered in for some time.

(Dierbach, *Die Neuesten Entdeckungen in der Materia Medica*, i. p. 81.)

COCHLIODUS, a genus of Placoid fishes, from the carboniferous limestone of Armagh and Bristol. (Agassiz.)

COCHLOSPERMUM. [Wittelsbachia, P. C.]

COCK, or STOP-COCK, a kind of valve contrived for the purpose of permitting or arresting at pleasure the flow of a liquid through a pipe. The contrivances adopted for this purpose are very various, but those in most common use consist of a short tube of brass, intersected by a nearly cylindrical plug, capable of being turned on its axis at pleasure, and so perforated or cut that, while in one position it completely prevents the passage of fluid through the pipe, it may be so turned as to permit the fluid to pass through it, and consequently to flow through the pipe as though there was no plug to intercept its progress. In addition to the differences in the construction of the plug or valve itself, many varieties are required in the form and arrangement of cocks, to meet the various circumstances under which they are applied. Those which, under the name of *taps*, are employed for drawing off the contents of barrels, simply need to be driven into the holes provided for them, which, before the barrels are broached, are filled with corks to prevent the escape of their contents. This kind of cock, which has been selected for illustration in the following figures, usually terminates in a curved *nose*, or spout, from which the liquor may be conveniently received in a jug or other open vessel; but where it is desired to transfer the liquor from the
diately to bottles, the nose is prolonged into a lo
tube, which will enter the neck of a bottle, and ob
necessity for a funnel. Longitudinal furrows sho
on the outside of the tubular nose, to allow the esc
from the bottle as the fluid enters. Other cocks
character are adapted for insertion in metallic
boilers, and fitted with a flange to bear against the
of the cistern, and a nut, wormed on to the portion
of the cock which passes into the cistern, by which
be screwed up firmly. Others again are adapted
ing to the end of a leaden pipe, such as the servi
laying water on to a house. Some stop-cocks, aga
nose or spout, but are made alike at each end, for
of being soldered between two lengths of leaden p

Fig. 1.

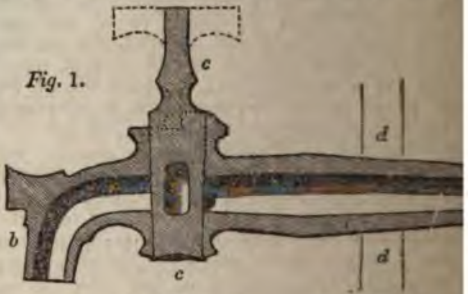
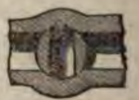


Fig. 2.



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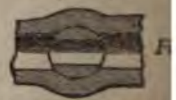
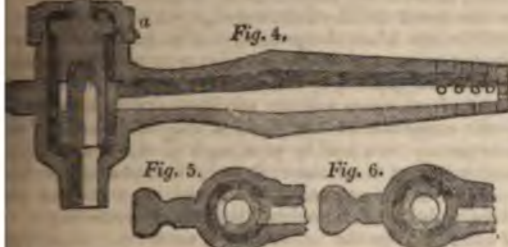


Fig. 1 represents, in section, one of the mo
kinds of cock or tap, constructed for insertion i
as represented by the dotted lines at *d*; *a* is the
into the barrel, and perforated with a number of
through which the surrounding liquor passes into
of the cock, but which, by their minute size, pre
trance of foreign bodies which may be floating in
nose or spout, through which, when the cock is
liquor runs out into the vessel placed to receive
nearly cylindrical plug, rather smaller at the lo
the upper end, accurately turned, and ground into
ing formed through the cock to receive it, and havi
slit or passage formed transversely through its
may, according to the position of the plug, either co
or be made to lie across and be totally disconnect
tubular passage through the cock. This point is mo
plained by *Figs.* 2 and 3, which represent horizo
of the plug and its socket or barrel, *Fig.* 2 showin
in the position represented in *Fig.* 1, in which
completely intercepts or closes the passage through
and *Fig.* 3 showing the plug as turned one quarte
as to cause its passage to coincide with that of the
cock. The upper end of the plug is prolonged into
head or handle, by which it may be conveniently
it is usual to add a stop-pin, indicated by dotted l
upper part of the plug in *Fig.* 1, which, by limiting
of the plug, lessens the risk of leaving it impro
off. The plug, which is inserted from above, is
its proper position by slightly riveting its lower
so that, while it may be turned round freely upon
cannot be withdrawn from the cock without
force. When, by wear or corrosion, the plug b
loose, and thereby occasions the cock to leak, the
may be filed, and the plug driven out and reground
reduced in size by this operation, it must of course
further in; and to provide for this contingency
passage through the plug is usually made, as rep
Fig. 1, somewhat longer or deeper than would be
merely to coincide with the tube or bore of the
projecting block of metal in front of the nose of th
serves it from being injured by the force required
into the barrel.

One of the first improvements on this contriva
claims notice is that of securing the plug in its pla
of a screw in its lower end, instead of by riveting;
arrangement the plug may be readily withdrawn f
pose of cleansing the cock. Of the many improve
which the common form of the plug is departed fro
presented in *Fig.* 4 is highly ingenious. In this

tube or bore of the cock opens into a vertical cylindrical er or barrel which is lined with a hollow cylinder of nd within the cylinder of cork is another hollow cylin- metal, which constitutes the moveable plug of the cock.



gh one side of this hollow plug a circular hole is formed a way that in one position of the plug it will coincide he horizontal passage of the cock, which is continued h the cork lining of the vertical chamber, and thereby the liquor to escape by the vertical nose or spout, by turning the plug half round the solid side of the exposed to the passage of the cock, so as effectually e it. The cork is represented in the cut by a dark tint, this, as in the case of the common cock, separate cuts en to show the transverse section of the plug, *Fig.* 5 g it in the same position as *Fig.* 4, so as to close the pas- nd *Fig.* 6 representing it as turned round to open the . For the sake of variety this cock is represented t the usual T-shaped handle, the top of the plug being ned as to be turned by a moveable key, which is in- through a hole in the brass cap which is screwed on to p of tne vertical chamber of the cock. To guard against ssibility of opening the cock without the key, by un- ng this cap, it is secured by the insertion of a little at *a*, which, from its position, cannot be removed while ck is fixed in a barrel, although it may be easily taken en it is desired to open the cock for the purpose of ng the interior. If kept from grit, which would cause rk to wear away, a cock of this description will work very long time without leakage; the wetness of the ausing it to swell so as to keep every part water-tight, ut impeding the smooth and easy action of the cock. her kind of cock, in which the elasticity and imper- lity of cork is usefully applied, has no cork lining to the der, but has what may be termed a skeleton plug of one side of which is filled with a semi-cylindrical piece k, while the other is left open to allow the liquor to through it.

many cocks the principle of the revolving plug is ther departed from. The simplest of these is a kind of scribed by Hebert (*Engineer's and Mechanic's En- pedia*, vol. i. p. 381), consisting simply of a curved tube ch the end driven into the barrel is closed by a flat disc al, covered with a leather washer, which may either be into close contact with the end of the pipe, or pushed om it to allow the liquor to enter, by means of a slender hich passes longitudinally through the horizontal part cock, and through a hole just above the nose, which s well as the part of the rod passing through it, is d. A transverse handle being fixed on the projecting the rod affords the means of screwing it in or out, so as to open or close the passage at pleasure. A very r though more complicated cock on this principle has sc-valve applied to the lower end of a vertical pipe, at by which the liquor escapes in the cock represented . 4; and, instead of working the valve by means of an l rod, the screw of which must be exposed to the action liquor, has two screwed rods, outside the passage for uor, which are moved simultaneously by the applica- a key of the ordinary kind. In this and other cocks lar character, leather has been found to act imperfectly, ts liability to become hard and horny when frequently , and, though we are not aware of its adoption by any cturer of cocks, caoutchouc has, we believe, been ap- uccessfully as a substitute for it. Another kind of cock, ch there are several varieties, has a solid conical valve, e of being either pressed into its seat, which must be d with great accuracy, or removed from it to allow the to escape, by means of a screw. In all cocks in which re is communicated to a valve, of whatever form, by of screws, particular caution is required when, as is often the case in large cocks, a lever handle or key, fixed on to a squared axis, is employed; as the purchase afforded by such a handle is apt to lead to the application of too great force, by which the valves are injured. Another ingenious but hitherto not very successful class of cocks consist essentially of two concentric plates or discs pierced with openings, which may be made to tally with one another when it is desired to allow the liquor to flow through the cock, but which may, by a small change in their relative positions, form a perfect barrier to the fluid, by the solid portions of one disc being brought to cover the openings in the other, on the plan of the well-known ventilating apparatus employed to admit or exclude a current of air from a flue.

In drawing off liquors from a close barrel it is necessary not only to open a passage by which the liquor may escape, but also to admit air to occupy the place of the liquor abstracted. This is commonly effected by means of a conical plug of wood called a vent-peg, which is inserted in a small hole in the upper part of the barrel, so as to prevent the access of air when it is not required, but which may be taken out while liquor is being drawn off. A very convenient substitute for the common vent-peg, intended especially for small beer-barrels, is manufactured in brass. It consists of a small tube of brass, which is screwed into the peg-hole, closed by a valve which is kept in its place by a spring, but capable of being opened by pressing the finger on a small lever while the cock is open. Cocks have been contrived to avoid the necessity of using a vent-peg, by causing an entrance for air to be opened by the action of opening the cock. Hebert represents, in the work above referred to, two contrivances of this character, each of which has a small pipe to conduct the air, which is admitted, by the act of turning the cock, through an aperture provided for the purpose, to the upper part of the barrel, above the surface of the liquor; the pipe being in the one case outside the barrel, while in the other it is carried up inside the barrel or vessel. The latter plan is considered preferable for large fixed vessels in breweries and distilleries, because the air-pipe, being enclosed, is shielded from injury. Taps are manufactured for small beer-barrels, under the name of siphon-cocks, in which this object is effected without the aid of an air-tube, a contrivance being added to the cock itself, by which, whenever the cock is opened, a small current of air is caused to enter an aperture near the nose of the cock, and to pass along a little tube fixed longitudinally in its bore, from the inner end of which it bubbles up through the liquor.

The common mode of securing liquor-taps from improper opening by the use of a moveable key in lieu of the fixed T-shaped handle, is very imperfect, owing to the facility with which a key of the kind usually employed is imitated, and the comparative ease with which the plug may be turned round without a key, especially in the case of a cock resembling *Fig.* 1, in which the plug may be turned round by the application of a strong fork to its lower end. Owing also to the friction unavoidable in large cocks, their keys are necessarily made too large to be convenient for carrying in the pocket. In some cases an apparatus is put on to the cock after use, and secured by a padlock, which completely prevents the opening of the cock, but it is both cumbersome and expensive, and very inconvenient in use, as it must be removed every time the cock is opened. Mr. W. Russell, in a communication to the Society of Arts, published in the thirty-seventh volume of their 'Transactions,' pp. 94-100, describes a very superior contrivance of his own invention, in which a pin is pressed by a spiral spring into a cavity in the plug, so as to prevent its turning, and drawn back, when it is necessary to open the cock, by means of a small tubular or pipe-shaped key, the interior of which is cut with a female screw to receive a worm cut upon the outermost end of the stop-pin, which is of course inclosed in such a manner as to be inaccessible excepting by means of the key. The same paper contains a description, fully illustrated by engravings, of another apparatus on the same principle, but rendered still more secure by the addition of a box of guards resembling those which constitute the peculiarity of Bramah's lock. [Lock, P. C. S.] One of the advantages of Mr. Russell's contrivances is their applicability to cocks of the ordinary construction at a moderate expense; and another is the portability of the key required to secure even the largest cock, such locking key not being employed to open the cock itself.

Some of the superior kinds of cocks are manufactured in fine brass, and others, intended for use with vinegar or other corrosive liquors, of a white alloy less liable to be injured by acids; but the greater part are formed of a peculiar alloy known by the name of *tap-metal*, which is defined by Holland (*Manufactures in Metal*, in Lardner's 'Cabinet Cyclopædia,' vol. iii. p. 169) as inferior brass, or rather 'copper, so saturated with lead, that on exposure to but an inconsiderable degree of heat the latter ingredient readily oozes through the pores of the mass.' 'Crude lead,' observes this authority, 'does not amalgamate with copper in the composition of cock-metal; it is therefore arsenated, or "killed," as the workmen term it, as in the method of preparing it for shot.' Cocks are cast in moulds, with a core, the plug and the barrel being formed separately, and the vertical perforation in which the plug works (to which the name of the barrel is in some cases confined) is afterwards turned 'smooth by means of a quadrangular steel rinder. To make this tool cut smoothly, and to prevent its cutting angles from removing the metal too rapidly and in an irregular manner, slips of wood are applied to its flat sides, so as to fill the cylinder without interfering with the cutting, or rather, scraping angles. A very superior mode of cutting or boring the barrels of cocks, or any similar hollow cones, by an ingenious addition to the common lathe, was communicated to the Society of Arts in 1810 by Mr. Charles Williams, and is described in the twenty-eighth volume of their 'Transactions,' pp. 196-198. The barrel having been thus bored, and the plug turned to fit it, the two are ground together with a little fine sand and oil. To remedy some of the defects of brass cocks, it has been attempted to manufacture them of cast-iron, and Holland refers to a patent obtained in 1806 by Mr. Cawood, of Leeds, for a plan of making cocks of soft cast-iron, and afterwards fitting them with bushes and other parts of brass or bell-metal, attached by soldering. Cocks manufactured by this method, Holland observes, 'are not liable, as is often the case with those cast of the usual compound metal, either to become cloggy, or to expand and contract considerably with each change of temperature.' 'They are moreover,' he adds, 'readily renewed in the parts exposed to wear.' The best cocks for corrosive liquors are those known as Ridgway's porcelain cocks, which are made of the strongest porcelain or stoneware. Hebert gives a cut of one of these cocks, the construction of which, excepting in the absence of the cylinder of cork, closely resembles that of the cock represented above in *Fig.* 4. We see no reason why the cork cylinder should not be added whenever such cocks are used for liquors which would not act upon the cork; and probably the application would be found even more advantageous than with metal cocks, owing to the greater difficulty of rendering so hard a material as stoneware perfectly true and water-tight.

The *four-way cock* is an ingenious contrivance resembling in some respects the cocks above described, yet sufficiently distinct to be noticed separately from the kind of cock to which this article chiefly relates. It consists of a plug perforated with two distinct passages, and mounted in a barrel into which four separate pipes or channels open; and its object is to connect the four passages with each other in alternate couples, either by a continuous revolution upon its axis, or by an alternating motion through one-fourth part of a revolution. *Figs.* 7 and 8, in which a four-way cock is represented in section in two different positions, will illustrate this action. In these diagrams *a*, *b*, *c*, and *d* represent four pipes between which it is desired to establish a communication which shall afford the means of connecting at pleasure the pipes *a* and *b*, and *c* and *d*, or, by a simple movement of the cock to disconnect these, and connect *a* and *d*, and *b* and *c*. This beautifully simple apparatus has been adopted by several of the inventors and improvers of the steam-engine, as a means of alternately admitting steam to and allowing it to escape from each end of the engine-cylinder. Referring to the above figure, the pipe marked *a* may be supposed to be the steam-pipe communicating with the boiler, *c* the waste-pipe for the exit of steam after it has impelled the piston, and *b* and *d* the pipes communicating with the top and bottom of the cylinder, respectively. In the position of the e sented in *Fig.* 7 the steam-pipe is placed in com with the top of the cylinder, while the lower end o der communicates, through the waste-pipe *c*, with sphere, so that the piston will be impelled down the movement of the valve or cock upon its axis to of 90° brings it into the position of *Fig.* 8, in whic from the upper part of the cylinder may escape b through the pipe *b*, by which it entered, to the *c*, while fresh steam will be admitted underneath by the connexion of the pipes *a* and *d*. The consequently rise, and by so doing will set in mo paratus for returning the cock to its first position, repetition of the process. The great improveme valves, which work with less friction than four-wa do when of large size, and admit of more ready ad the admission and cutting-off of the steam, has le use of four-way cocks for this purpose, exceptin cases, in very small engines.

Fig. 7.

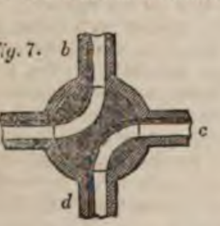
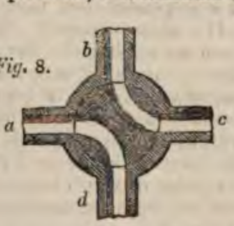


Fig. 8.



COCOA. [Cacao, P. C.; Theobroma, P.

CODEX. [Code, P. C.]

COELACA'NTHUS, a genus of fossil fishes, w in the coal formation and the magnesian limest north of England. (Agassiz.)

COELLO, CLAUDIO, a celebrated Spanish p at Madrid in the earlier half of the seventeenth ce father Faustino Coello, who was a Portuguese bro wished to bring up his son to his own business, and with Francisco Rizi to learn to draw. Rizi ho soon perceived the great abilities of young Coello his father to allow him to become a painter. By tion of Rizi, and by copying a few of the picture Rubens, and Vandyck in the palace at Madrid, came a very able painter, and produced several exc pieces while still with Rizi. He executed also s in fresco in company with Josef Donoso, espec occasion of the marriage of the king Charles II. Louisa of Orleans. In 1680 he was appointed ca to that king in the place of Carreño, deceased, w of twenty ducats per month.

In consequence of the death of Rizi, Coello was the king to paint the great altarpiece for the sa Escurial, in place of one which had been commen The subject was the procession and ceremony of t tion of the Host on the altar of the Sacristy, 'Co la Santa Forma,' which took place in 1684 in the Charles II. and his officers of state: the picture wards of fifty portraits, and was completed by Coe three years, to the utmost satisfaction of the k Coello's masterpiece, and one of the finest produc Spanish school, combining the design of Cano, th of Murillo, and the effect of Velazquez. Cumber in the highest terms of this picture; he calls it composition, and says that it maintains its rank, company with the productions of Raphael, Titia greatest Italian and Flemish masters. 'I do not he continues, 'ever to have seen such a strikin clairobscure and force of perspective. In the gr sons who form the grand procession of the Colloca are to be found the portraits of the king and all th nobility of his court, executed to the life itself; ev traced with the most masterly and determined pe a majestic and orderly solemnity is observed in t ment of his figures, as bespeaks the art of the co suits the dignity of his subject; all the accompanim such perfect harmony, and the colouring of the p and glowing with such forcible and clear relief, th the most ravishing spectacle that art can form.' berland's opinion, Coello's style very much resem Paul Veronese. Coello died of jealousy and vexatio in consequence of the arrival of Luca Giordano at the invitation of the king to paint in fresco the gre and other principal parts of the Escurial. Giorda in May, 1692, and Coello died eleven months having from the time of Giordano's arrival, with tion, resolutely adhered to a determination to pain The Martyrdom of St. Stephen, for the Dominic at Salamanca, was the only work that he finished, of on hand, after the arrival of Giordano at Madrid.

There are several altarpieces and frescoes by Madrid, and some at Saragoza and other places.

(Cean Bermudez, *Diccionario Historico*, &c.; Cu *Anecdotes of Eminent Painters in Spain*.)

OELN, WILHELM VON, or William of Cologne, a rated old German painter, of the latter part of the fourh century, called also Meister Wilhelm. There are seveocuments which satisfactorily prove the existence of this er, but there are no data by which any of his works e identified: many paintings in distemper of the old gne school are attributed to him, upon no other grounds conjecture; but none but the best productions of that l are awarded to him.

e exact date of his birth is not known, but the place rs to have been Herle, a village near Cologne, whence also called in some documents Wilhelm or Wilhelmus de . He was settled in Cologne, with his wife Jutta, as as 1370; and there is a passage in the Annals of the nican monks of Frankfort, which testifies to his great ation: ten years later, it says—'in that time, 1380, there t Cologne a most excellent painter, to whom there was he like in his art; his name was Wilhelm, and he made res of men which almost appeared to be alive.'

ere were celebrated painters at Cologne however long e this period, for Wolfram of Eschenbach, who lived at ommencement of the thirteenth century, in speaking, in em of 'Parcival,' of the beauty of a knight on horseback, that no painter of Cologne or Maastricht could make a r picture than the knight on horseback was:—

> Von Chölne noch von Mastricht
> Dechein Seiltere entwurf 'en baz,
> Denn ais er ufem orse saz.

he works attributed to Meister Wilhelm, the following he principal:—the picture over the tomb of Cuno von enstein in the St. Castors-Kirche at Coblenz, painted in ; the large altarpiece of the church of St. Clara at Co, which is now in one of the chapels of the cathedral; it is enty-six compartments illustrating the life and passion of st; the Sancta Veronica, formerly in the Boisserée coln, now belonging to the king of Bavaria, and in the kothek at Munich, and of which there is a beautiful graph by Strixner; and a Crucifixion, and a half-length nna and infant Christ, in the Wallraf Museum at gne.

eister Wilhelm was also supposed to have been the r of the so-called Dom-bild, or Cathedral-picture, which formerly the altarpiece of the chapel of the Rath-haus of gne, but is now in the cathedral, and is at present gene attributed to Meister Stephan, the supposed scholar of ter Wilhelm. There are also in the Pinakothek at ich (cabinet i.) four other pictures of various saints, tly on gold grounds, besides the Sancta Veronica, attrid to this painter. They are all remarkable for richness lour and extreme diligence of execution, in the heads in icular, which all have a true nobility of expression. nically, likewise, they are very remarkable works; for gh in water-colours, in a species of tempera, they are l, or even in some respects superior, in impasto to the f oil paintings, and very similar in effect: they are how Gothic in design; and in the extremities, especially the s, are totally devoid of proportion and modelling. Ex for this last-mentioned defect, they would bear a perfect mblance to the works of the so-called school of Van Eyck; ven in the vehicle in which the colours have been mixed is no apparent difference, and, as already stated, that are by Wilhelm von Cöln is a mere conjecture.

here is no other record of Stephan von Cöln, the Dom-Meister, than a note in the journal 'Tagebuch' of Alht Dürer, which attributes this celebrated picture to him. as painted in 1410, and is the most valuable picture of ld school of Cologne. It consists of a centre and two ving wings, painted on both sides. The outside of the s represents the Annunciation; the centre represents the ration of the Three Kings; and on the interior of the s are patrons of Cologne, St. Gereon and St. Ursula, with r companions in martyrdom. There are three other works of school, which from their similarity of style are attributed to master: the altarpiece formerly in the Benedictine Abbey Heisterbach, near Bonn, now existing only in parts; the piece formerly in the church of St. Lawrence, at Cologne, wise divided into parts and scattered; and a picture of the lonna and Child, with Angels, in a private collection at gne.

Fiorillo, *Geschichte der Zeichnenden Künste in Deutsch*, &c.; Passavant, *Altkölnische Malerschule*, in his 'Kunste durch England und Belgien;' Dillis, *Verzeichniss der nälde in der Königlichen Pinakothek zu München*.)

COELOPTY'CHIUM, a genus of Spongiadæ, proposed by Goldfuss, for some fossils of the chalk.

COGNO'VIT is a plea, in an action at law, whereby the defendant acknowledges or confesses the justice of the plaintiff's demand against him (*cognovit actionem*). By this plea a trial is avoided and judgment is entered up for the plaintiff. But where the action is for damages, this judgment is not final, as the amount of damages remains to be assessed by a jury, under a writ of inquiry, which is executed by the sheriff, by the agency of his under-sheriff. When the jury have assessed the damages, the sheriff returns the inquisition, which is entered upon the roll in the form of a *postea*, and the judgment is then complete, the defendant's plea having already confessed the cause of action, and the damages having been assessed by a jury. If the action be for the recovery of a specific amount, as in an action of debt, the judgment entered up upon a plea of *cognovit actionem* is conclusive against the defendant, as it confesses the entire declaration. On this account it is a common practice for a debtor to strengthen the security of his creditor by executing a warrant of attorney to an attorney named by the creditor, authorising him to confess a judgment by a plea of cognovit in an action of debt to be brought by the creditor against the debtor for the specific sum due to him. But in order to prevent fraud, it is provided by 1 & 2 Vict. c. 110, § 9, 10, that such warrant of attorney or cognovit is of no force unless there be present an attorney of one of the superior courts, on behalf of the party who gives it, expressly named by him, and attending at his request, to inform him of the effect of the instrument before he executes it, and who must subscribe as a witness to the execution, and declare himself to be the attorney for the party. In order to make this process effectual as against the assignees of the debtor, if he should become bankrupt or insolvent, warrants of attorney and cognovits must be filed in the Court of Queen's Bench within twenty-one days after execution, or judgment must be signed or execution issued thereon within the same period.

(3 Geo. IV. c. 39; 6 Geo. IV. c. 16, § 108; 1 & 2 Vict. c. 110, § 60, 61; 6 & 7 Vict. c. 66. Harrison, *Digest of Reported Cases*, titles 'Bail,' 'Warrant of Attorney;' Stephen, *Comm.* vol. iii. p. 634.)

COHESION, MAGNETIC, is that power by which two magnetical bodies adhere together, as iron to a piece of loadstone.

The nature and laws of this power have been stated under MAGNET and MAGNETISM [P. C.], and it is intended here to notice merely the means employed to increase its intensity.

Loadstone is frequently combined with substances which have small or no attractive powers; and the poles, or points of contrary nature with respect to attractions and repulsions, being irregularly distributed, counteract in part one another's effects: thus a mass of loadstone often exhibits a comparatively small adhesive force; and it happens at times that, when the mass is broken in pieces, some of the portions, containing a considerable quantity of the attractive material favourably disposed, exercise a greater power than was exhibited by the entire mass. It is found that a piece of loadstone will seldom suspend more than 5 or 10 times its own weight, though some small specimens have been obtained which are said to have suspended more than 200 times their weight.

If a piece of iron be placed in contact with either pole of a magnetized bar, the force of the coherence is that which is due to the direct action of that pole only on the contrary magnetism of the iron: the intensity is at least doubled when the substance to be suspended can be placed at once in contact with both poles; and this is frequently effected by giving to the magnetized bar the form of a horse-shoe, so that the opposite poles may be near one another: but the most effectual method of increasing the power of a magnetic body is that of *arming* it.

Preparatory to arming a piece of loadstone the situation of its axis, that is, of a line joining its poles, must be determined by trial: the loadstone is then reduced to the form of a cube or parallelepiped nearly, having two opposite faces perpendicular to the axis; and these faces are ground very smooth. Two plates of soft iron equal in length and breadth to these sides are applied to the latter so as quite to cover them, and are connected together by a bar of soft iron which is attached to them at the upper end of each (supposing the two plates to be in vertical positions): to this bar is affixed a hook or ring by which the whole apparatus may be suspended.

The inferior extremity of each plate is formed with a foot which projects under the loadstone, so that the latter may rest upon both; and horizontal bands of copper or silver usually surround the loadstone and side pieces in order to keep the whole together. Under the feet is applied a bar or plate of iron, touching both; and this is provided with a ring or hook from which is to be suspended the weight to be held by the attractive force of the loadstone. Artificial magnets have been armed in a similar manner.

The attractive powers situated in the poles of a natural or artificial magnet seem to be diffused over the two surfaces in which those poles are situated; and the plates of iron which cover those surfaces, serving to condense the powers, cause them to act with united energies in the two feet of the apparatus, by which means the power is greatly increased. The feet of the side plates should not however be made to approach each other too nearly; since in such position they would diminish each other's attractive powers.

It is found that a magnet when armed exerts a force more than one hundred times as great as that of the magnet in its natural state; and it has been ascertained that, after as much weight has been applied as the armed magnet will suspend, if at certain intervals of time other weights be added, the magnet will suspend two or three times as much as before.

Daniel Bernoulli discovered by experiment that the attractive forces of magnets vary in proportion to their superficies and not to their masses; a circumstance in accordance with Mr. Barlow's discovery respecting the magnetic attractions of iron spheres.

COIRE. The manufacture of cordage, mats, matting, coarse canvas, and sailcloth, from the fibres of vegetables, has been known to the inhabitants of nearly all countries with which we have any acquaintance. *Coire*, or cocoa-nut fibre, is one of the materials so employed.

So far however from the source from which the material is obtained being alike in all plants, it differs considerably. In flax and hemp, the fibrous material is furnished by the stem, deprived of its ligneous centre or core. In the Spanish broom the fibres are furnished by the young pliant branches of a shrub; and these fibres are occasionally wrought both into cloth and into cordage. The stalks of the hop-plant, and also of the common nettle, are made to yield fibres applicable to a similar purpose; and so likewise may be those of the bean-plant and of the mallow. In other cases it is rather the bark of a tree than the stem of a young plant, that yields the fibres. Such is the case with the paper-mulberry tree, the bark of which is so prepared by the natives of Tahiti as to yield fibres fitted for a kind of cloth. Such is likewise the case with the linden-tree, the bark of which, prepared in a suitable way, is used for the manufacture of mats, baskets, bags, and thatching: it was estimated three or four years ago that fourteen million mats are made annually in Russia from this material, that for this purpose the bark of a million trees is required, and that a traffic equal to half a million sterling is thus created. Two other examples of the same kind are furnished by the maho-tree (*Hibiscus tiliaceus*) and the *Theobroma augusta*, two East Indian plants, the stalks of which are steeped and disentangled from the fibres of the inner bark. Another class of materials for similar purposes are furnished by the leaves of certain plants. The *Phormium tenax*, or New Zealand flax, has leaves which produce such fibres. The enormous leaves of the *Agave*, or American aloe, yield fibres capable of answering a similar purpose; and so likewise do several species of the *Bromelia*.

But *Coire* differs from all these in its origin. It is the fibre of the husk of the cocoa-nut; bearing some such relation to it as the downy fibres of cotton do to the seeds of the cotton-plant. The inhabitants of Ceylon make great use of it for this purpose. Mr. Marshall, a medical gentleman, who resided many years in Ceylon, published a few years ago a 'Contribution to a natural economical history of the cocoa-nut tree,' from which we gain information as to the mode in which the coire is prepared. The nut is gathered before being completely ripe; and in order to remove the husk, an iron spike or sharp piece of hard wood is fixed in the ground, and the nut is forced upon the point in such a manner as to separate the rind from the shell; one man can clear about a thousand nuts in a day by this means. The rind of the nut is soaked in water for several months, then beaten upon a stone with a piece of heavy wood, and afterwards rubbed with the hand until the intermediate substance is completely separated from the fibrous portion. The rind of forty average nuts supplies about six pounds weight of the fibre. This fibre constitutes the coire, which is then ready for use in the same way as hemp or other fibrous materials.

In the early part of the present century, Dr.
communicated to the Society of Arts an account of
experiments which he had undertaken, to test th
strength of coire and other kinds of fibre; from
appears that this material possesses great tenacity
Dr. Roxburgh remarks, that 'coire is certainly th
material yet known for cables, on account of its gre
and strength.' The material is very buoyant, and
for making ropes of large diameter. Mr. Mars
that until chain-cables were introduced, all the s
navigated the Indian seas had cables made of this
that the fibres are rather improved than injured by
in sea-water; but that the smoothness and elasti
coire-cordage, though very advantageous to runni
and the light lines of a ship, render it less fitted fo
rigging.

There has been a branch of manufacture introdu
the last few years in England, in which coire is
rather differently than in the above-described
This is for the production of rugs, druggets, mat
mattresses, and similar coarse goods. Dampier
two or three centuries ago the production of cloth f
material; for he says, in his 'Voyage Round the
have been told by Captain Knox, who wrote the "
Ceylon," that in some places of India they mak
coarse cloth of this husk of the cocoa-nut, which is us
Myself have seen coarse sailcloth made of such a k
stance.' Besides the actual weaving or plaiting
terial into textile fabrics of a coarse kind, it is use
fing for mattresses, pillows, and cushions. Damp
to the use of the fibres to caulk the seams of ships
Marshall speaks of the employment of them in Indi
mattresses, cushions for couches, and saddles, as a
for horse-hair. The availability of the material
purpose seems to depend upon these qualities:—th
is very indestructible; that it does not harbour
horse-hair would in a warm climate; and that it h
offensive smell.

COKAINE, or COKAYN, SIR ASTON, w
1608, at the country-seat of his father, a Derbysh
of old lineage and considerable property. After h
educated at both universities, he was entered for
in the inns of court, and travelled on the Continen
a Roman Catholic and royalist; and both of these
exposed him to much suffering in the civil war. I
part of his life he was obliged to part with his esta
ing a small annuity for his support. He died at
1684. He published four plays, which, with ot
were collected, in 1669, in two volumes, small o
very rare. The plays and the poems are equally
but Sir Aston's name deserves some notice for his
macy with the dramatic poets of his time, and for th
tion furnished, in regard to the history of the dram
commendatory verses which make up a large propo
compositions. It has been justly regretted that h
set down in distinct prose the facts of which he w
session, instead of hinting at them briefly and ob
snatches of wretched doggrel.

COKE, or, as it is sometimes written, **COAK**,
vested of its gaseous and more volatile constituents
combustion in close chambers, or in heaps from
free access of air is excluded. Being composed
tirely of carbonaceous matter, coke is a fuel much
better adapted for use in smelting and various oth
than raw or uncoked coal; and as it is divested of
stituent parts which produce most dark-coloured s
especially preferred in cases in which it is necessar
the emission of smoke, as for the furnaces of locom
gines. The introduction of railways has occasion
large demand for coke for this purpose, though its
manufacture of iron has been diminished in some
the adoption of the hot-blast for furnaces, by the ai
uncoked coal may be used in lieu of coke.

The simplest mode of coking coal, which is still
ally followed, is to lay the coal in large flattened he
containing thirty or forty tons each, in the open air
it with ashes and earth to confine the heat, so that
of coal may be slowly burnt in a smothered man
being employed during the process, to renew the
wherever the fire may begin to burn through too fier
Ure, in describing various modes of making coke in
(*Dictionary of Arts*, &c., art. 'Pitcoal, Coking of
sents both circular and oblong coking *meilers* or

haracter, the former being piled round a central chimney of loose bricks, towards which small horizontal flues are mong the lumps of coal forming the mound; while in tter vertical flues or chimneys are provided by the in- n, while the mounds are forming, of wooden stakes, , when the whole pile is completed, are withdrawn, place being filled up with readily combustible materials, in igniting the mass of coal. The exterior of these is covered with *slack*, or coal dust, and clay.

best and most economical method of making coke is in ovens, which are built in various forms. In the account Butterley Iron-Works in No. 764 of the 'Penny Maga- view is given of the range of coke-ovens connected that establishment, about one hundred in number, each a brick structure eight or ten feet high, with a flat roof hich is an opening for introducing the coal, and with er opening in front from which to remove the coke. ovens being placed side by side in a continuous range, a ay is laid along their flat roofs by which the coal is ht close to the charging-holes, while another, running lower level, in front of the openings by which the coke en out, affords facilities for its removal. Dr. Ure, in rticle above referred to, gives details of various forms of -ovens, of which we can only notice the very excellent adopted by the London and Birmingham Railway Com- for making coke at the Camden-Town Station, for the f their locomotive engines. Each of these ovens is, in- ally, of an elliptic form, measuring twelve feet by eleven clear, and surrounded by brick-work three feet thick. internal height is not stated, but according to the section given it appears to be about four feet, the floor being bedded upon a thick stratum of concrete, and the roof in form of a flat dome. In the front of each oven is an ing about three feet square, covered by a cast-iron door d with fire-bricks, which slides up and down by means of and counterweights. At the back of the roof is an ing, capable of being wholly or partially closed by a ng damper communicating with a horizontal flue which cts the smoke to a high chimney serving for the whole of ovens. The ovens are charged through the front ng with about three tons and a half of coals, upon the of which a little straw is thrown. The oven being very from its preceding charge, smoke begins immediately to from the mass, while the straw becomes ignited by radia- from the dome. By the active combustion thus excited surface of the coal the greater part of the smoke is ed, all that arises from the half-ignited coals having to ough the fully-kindled coals on the surface, which are exposed to the access of air, both the furnace door and e being for a time left fully open. As the operation his, the fire burns regularly downwards, and the doors dampers are gradually closed. After a calcination of ards of forty hours the doors and dampers are perfectly d, by which means the mass is partially cooled, and itself into prismatic concretions, somewhat resembling nar basalt, and when sufficiently cooled the furnace is d, and the mass of coke is broken up with iron bars thrown out upon the pavement to be extinguished by kling water over it. When the coking is conducted in manner a very small quantity of unconsumed gas and soot es, and the coals, if good, yield about 80 per cent. of act glistening coke, weighing about 14 cwt. per chaldron. dinary coking-ovens the loss in weight is about 25, in- of 20 per cent., but the bulk of the coal is increased t 25 per cent. by the process.

he production of coke in the manufacture of coal-gas is ed to under Gas-lighting, P. C., pp. 86, 87. Various have been tried for converting the furnaces of steam- nes into coke-ovens, so as to make profitable use of the ense heat which is usually wasted in the manufacture of ; but a description of such would involve much detail, perhaps be rather premature, as we are not aware whe- any have been brought into operation on a sufficiently nsive scale to afford grounds for an accurate judgment n their merits, though some, tried experimentally, have fair to realize considerable advantages.

OKE, J. W. [Leicester, Earl of, P. C. S.]

OLEBROOKE, HENRY THOMAS, the late very nent Oriental scholar, was the third son of Sir George ebrooke, Bart., and was born in 1765. His mother was ry, only daughter and heiress of Patrick Gaynor, of An- a, Esq. He never was at any public school, but was cated at home by a private tutor. In his twelfth year he was sent to France, and he remained in that country till he was sixteen. His own inclination at this time was to enter the church; but the position of his father, who was one of the directors of the East India Company, naturally led to the selection of another career for him, and in 1782 he was appointed to a writership in India. For the first three years after he went out he resided at Calcutta, and was attached to the Board of Accounts; he was then transferred to the revenue department at Tirhoot. During his residence at this station he acquired a fondness for field-sports, which he retained while he lived. In 1789 he was removed to Purneah; and having been soon after appointed a member of a commission deputed by the government to investigate the resources of Bengal, he drew up, in conjunction with Mr. Lambert, a merchant of Calcutta, and printed for private circulation, in 1794, a very able tract, entitled 'Remarks on the Agriculture and Commerce of Bengal, by a Civil Servant of the Company,' which, besides a mass of new and valuable information, announced some propositions much beyond the current ideas of the time; among others, that of a free trade between India and England. Colebrooke's portion of this treatise was reprinted and published at London, in 1806, under the title of 'Remarks on the Husbandry and Internal Commerce of Bengal;' and an account of it may be read in the Edinburgh Review, No. 19 (for April, 1807), pp. 27-40. (See also No. 8, p. 314; and No. 40, p. 477.) Some time before this Mr. Colebrooke had begun to study the Sanscrit; and, having now undertaken the translation of the collection or digest of Hindu law formed under the superintendence of Sir William Jones, he had finished his task before the close of the year 1796; and the work was published, under the title of 'A Digest of Hindu Law on Contracts and Successions, from the Original Sanscrit,' in 3 vols. 8vo., at Calcutta, in 1797. Soon after the foundation of the College of Fort William, he was appointed to the Professorship of the Sanscrit Language; which he appears to have held till he was removed to a judicial situation at Mirzapore. He was subsequently promoted to be Chief Judge of the courts of Sudder Dewannee Adawlut and Nizamut Adawlut; and he was for a time President of the Board of Revenue, and a member of the Supreme Council of Bengal. He was also for some years a Director of the Asiatic Society of Bengal; and many of the most valuable papers in their transactions (The Asiatic Researches) were contributed by him; particularly, 'On the Duties of a Faithful Hindu Widow,' in vol. iv.; 'Examination of Indian Classes,' in vol. v.; three 'Essays on the Religious Ceremonies of the Hindus, and of the Brahmans especially,' in vols. v. and vii.; 'On the Sanscrit and Pracrit Languages,' and others, in vol. vii.; a highly curious discourse 'On the Vedas, or Sacred Writings of the Hindus,' in vol. viii.; 'Observations on the Sect of Jains,' 'On the Indian and Arabian Divisions of the Zodiac,' 'On Ancient Monuments containing Sanscrit Inscriptions,' and others, in vol. ix.; a very elaborate disquisition 'On Sanscrit and Pracrit Poetry' (or rather prosody), in vol. x.; and 'On the Notion of the Hindu Astronomers concerning the Precession of the Equinoxes and Motions of the Planets,' in vol. xii. To the Transactions of the Royal Asiatic Society of Great Britain, after his return to his native country, he contributed a 'Discourse,' read at the institution of the Society (15th March, 1823), and other papers, in vol. i.; and five papers 'On the Philosophy of the Hindus,' in vols. i. and ii.; and he was also an occasional writer in the Asiatic Journal. He likewise published at various times the following separate works:—A Collection of Compositions in Sanscrit, for the use of the Students of the College of Fort William, including the Hitopadesa [Bidpai, P. C., iv. 388], with Introductory Remarks, 4to., Calcutta, 1804; 'Grammar of the Sanscrit Language,' folio, Calcutta, 1805; 'Amera Cosha, or Dictionary of the Sanscrit Language, by Amera Sinha, with an English Interpretation and Annotations,' 4to., Calcutta, 1808; 'Two Treatises on the Hindu Law of Inheritance, translated from the Sanscrit,' 4to., Calcutta, 1810; 'Algebra, with Arithmetic and Mensuration, from the Sanscrit of Brahmegupta and Bhascara,' 4to., Lond., 1817; a tract 'On the Import of Colonial Corn,' 8vo., Lond., 1818; and 'Miscellaneous Essays' (or reprints of previously published papers and prefaces), 2 vols. 8vo., Lond., 1837. He also, in conjunction with Professor Wilson, translated from the Sanscrit, for the Oriental Translation Fund, 'Sankhya Karika, or Memorial Verses on the Sankhya Philosophy, also the Bhashya, &c.,' 4to., Oxford, 1837. Mr. Colebrooke, who held, along with his two brothers, the patent place of Chirographer in the Court of

Common Pleas, died at his house in York Terrace, Regent's Park, London, on the 18th of March, 1837. His son, the present Sir Thomas Edward Colebrooke, has since succeeded to the title and the large fortune of his father's elder brother, Sir James Edward Colebrooke, Bart., who died at Tunbridge Wells, on the 5th of November, 1839.

('Memoir' (which is however extremely imperfect) in *Gentleman's Magazine* for September, 1837, stated to be in part abridged from a communication read by Mr. Colebrooke's son before the Royal Asiatic Society; Colebrooke's various publications; *Asiatic Researches; Edinburgh Review.* See also ALGEBRA, P. C., p. 325; HINDU LANGUAGES, P. C., p. 226, *et seq.;* SANSCRIT LANGUAGE AND LITERATURE, P. C., p. 397, *et seq.;* VEDA, P. C., p. 171, *et seq.;* VIGA GANITA, P. C., p. 318, *et seq.*)

COLERIDGE, HENRY NELSON, the son of Colonel Coleridge, a brother of the poet [COLERIDGE, P. C.], was born at the beginning of this century. He was educated on the foundation at Eton, and in due course was elected scholar, and subsequently fellow, of King's College, Cambridge. He took his degree of B.A. in 1823. The scholars of King's having the somewhat questionable privilege of obtaining their degrees without examination, Mr. Coleridge's name is not found amongst the candidates for classical or mathematical honours; but he was well known in the University as one of great talents and rich acquirements, and he gave public evidence of his taste and scholarship, in 1820 and 1821, in the first of which years he obtained two out of the three of Sir W. Browne's medals, namely, that for the Greek ode and that for the Latin ode, and in the second year was again the successful candidate for the Greek ode. In 1823 he was a contributor, in conjunction with W. S. Walker, W. M. Praed, T. B. Macaulay, J. Moultrie, and others of his university, to 'Knight's Quarterly Magazine.' His papers, which bear the signature of 'Joseph Haller,' on 'The English Constitution,' 'The Long Parliament,' 'Mirabeau,' &c., are distinguished for a soundness of opinion, and a liberal and comprehensive view of historical questions, which are evidence of the extent of his acquirements beyond the ordinary range of university reading. Having fallen into ill health, Mr. Coleridge, in 1825, accompanied his uncle, the Bishop of Barbadoes, on his outward voyage. Upon his return to England in the same year, he published a most lively and amusing narrative of his tropical experiences, under the title of 'Six Months in the West Indies.' In his introductory 'Reasons for going abroad,' he gives the following account of himself: 'The doctors disagreed. According to four first-rate opinions, I groaned at one and the same time under rheumatism proper, rheumatic gout, gout proper, and an affection in the spinous process. . . . . I went simply and sheerly on my own account, or rather on account of the aforesaid rheumatism; for as every other sort of chemical action had failed, I was willing to try if fusion would succeed.' The concluding chapter tells the favourable result: 'I am de-rheumatized. Whether I ate, drank, or sweated it out, I cannot say; but the fact is, I am well and flexible in all my limbs, and if the West Indies cured me, I am very much obliged to the West Indies for the favour.'

His restored health opened to Mr. Coleridge a course of honourable action. He was called to the bar by the Society of the Middle Temple, on the 24th November, 1826, and, during the ensuing fourteen years, gradually advanced to a good practice in the Court of Chancery. During this period he assiduously cultivated his literary tastes, and more especially dedicated all his leisure to the society of his illustrious uncle, whose conversation was a perpetual store of the most varied knowledge. The daughter of the poet, a most accomplished lady, herself an authoress, became his wife soon after he was called to the bar. In 1830 Mr. Henry Coleridge published an 'Introduction to the Study of the Greek Classic Poets.' Until the death of S. T. Coleridge, in 1834, his nephew most assiduously devoted himself to the grateful task of noting down with all reverence fragments of this extraordinary man's eloquent talk, or more properly declamation. In 1835 some of the results of this labour of love were given to the world in 'Specimens of the Table Talk of the late Samuel Taylor Coleridge,' in two small volumes. It has been objected that these fragments, in which Coleridge's opinions are arranged under particular subjects, give no just notion of the character of his talk. His nephew anticipates the objection: 'I know better than any one can tell me, how inadequately these specimens represent the peculiar splendour and individuality of Mr. Coleridge's conversation.
How should it be otherwise? Who could alwa
to the turning-point his long arrow-flights of t
Yet the book must always possess a deep interes
literal truth as a record of Coleridge's opinions,
it may fall short of giving an adequate notion of hi
expressing them, no one can doubt. The 'Table T
followed in 1836 by two octavo volumes of 'The Li
mains of S. T. Coleridge,' also edited by his nephe
third volume of the same series was published in 18
care and judgment with which this difficult unde
executed, have given to these fragmentary material
line leaves,—notes of the lecturer, memoranda of t
tigator, outpourings of the solitary and self-co
student,'—a permanent value. In 1837 Mr. Hen
ridge republished 'The Friend'—his uncle's la
periodical work—one of the most remarkable books i
literature. In 1840 he also edited 'Confessions o
quiring Spirit,'—a series of letters on the inspirati
Scriptures, left by Mr. Coleridge in MS. at his d
this mass of materials, which we owe in great part t
wearied industry of Mr. Henry Coleridge, amidst
leisure of a laborious profession, will be found the
dence of Coleridge's claims to a lasting reputation
and a philosopher.

We have little to add to this imperfect notice.
Mr. H. Coleridge had a return of the painful
which had received a temporary relief in 1825. F
months he was prostrate on a bed of sickness,
pain with a most exemplary fortitude and cheerfu
supported by that strong religious feeling which
principal feature of his character. He died on
of January, 1843, and was buried by the side of his
Highgate old church-yard.

COLIN, ALEXANDER, the sculptor of the
marble alti-rilievi of the celebrated tomb of the
Maximilian I. in the Kreuzkirche at Innsbruck. C
born at Mechlin in 1526, and in 1563 was invited by
peror Ferdinand I. to Innsbruck, to complete the
of his grandfather's tomb, which had been commenc
brothers Abel. They were completed by Colin,
help of assistants, in three years, for on one si
monument is 'Alexand. Colinus Mechliniensis, scul
1566.'

The sculptures consist of twenty-four marble tab
into the four sides of the tomb, and record all the
acts and victories of the emperor Maximilian. Th
are small, but they are executed with great skill and
care. The tomb is surrounded by twenty-eight
bronze statues of heroes of the middle ages: it is a
one of the most magnificent monuments in Europe,
often been mentioned in the very highest terms by
modern travellers. The bronze statues were execu
founder of the name of Hans Lendenstreich, and G
Löffler, two other Tyrolese sculptors and founders.
executed also the two monuments of his patron th
duke Ferdinand of the Tyrol and his first wife P
in a chapel in the Hofkirche at Innsbruck: the lat
the date of 1581. They are both extremely costly
borate works. There are other works by Colin in In
and its vicinity; some in wood, and of very minute
cellent workmanship. He was court sculptor to the
Ferdinand I. and to his son the archduke Ferdinand
Tyrol, and died at Innsbruck in 1612.

(Von Lemmen, *Tirolisches Künstlerlexikon.*)

COLLATIO, or MOSAICARUM ET ROMANA
LEGUM COLLATIO, or LEX DEI, is a compilati
bably made in the sixth century of our æra. It cons
comparison between the Law of Moses and the Roma
in sixteen titles. Each title has certain legal rules
head from the Law of Moses, headed thus, 'Moses d
which are subjoined, by way of comparison, rules of
law taken from the five Roman jurists—Papinian,
Gaius, Ulpian, and Modestinus—and from the three c
tions which preceded that of Justinian—the Greg
Codex, Hermogenianus Codex, and Theodosianus
The value of the Collatio consists solely in the extracts
it contains from the source above mentioned. The l
best edition of the Collatio is by Blume, in the Bonn
of the Corpus Juris Ante-Justinianei, and in the s
edition of 1833, 8vo. The first edition is by P.
Paris, 1573, 4to. It is also printed in Schulting's Ju
dentia Vetus Ante-Justinianea, Leyden, 1717.

COLLE, RAFFAELLINO DAL, a celebrated

er, born at Colle, near Città San Sepolcro, but in what is not known, generally considered as one of the scholars ssistants of Raphael in the Farnesina and in the Vatican; he was certainly, according to Vasari, the assistant of Romano in Rome, and probably at Mantua, and also asari himself at Florence in 1536, upon the occasion of sit of Charles V., when Vasari had the direction of the tions ordered by the authorities in honour of the em- s visit. As Vasari did not write the life of Raffaellino, is known about him. He appears to have been chiefly yed in the neighbourhood of Città San Sepolcro, at o, Perugia, Pesaro, Gubbio, Cagli, and Città di Castello, ich places he executed several fine altarpieces, which ist, and exhibit him as one of the best disciples of the n school. Notwithstanding his own reputation, he did isdain to enter into the service of Vasari in 1536, when de, from the designs of Bronzino, cartoons for the ta- s of Cosmo I. Another more striking instance of lity, or good fellowship, is recorded of him, which hap- d at San Sepolcro: Il Rosso arrived in the city at a time Raffaellino was about to execute a work which he had taken to paint, and he surrendered his commission to Il as a mark of his esteem for his ability. The date of eath is not known.

anzi, *Storia Pittorica*, &c.)

OLLISION, or PERCUSSION OF BODIES, is that of Dynamics in which are contemplated the effects g from the impact of a moving body on one which is r at rest or in motion.

e effects will evidently depend upon the directions of the s, with respect to a line joining the centres of gravity e two bodies, and upon the natures of the bodies them- s. If the directions coincide with such line, the bodies g spherical forms, so that the point of contact may be in me line, and the plane of impact perpendicular to it, the t is said to be direct; but if the directions are other- , the impact is said to be oblique.

ll bodies in nature have certain degrees of softness by h their particles yield to the force of impact: all have at me time certain degrees of hardness by which they the effort to penetrate each other; and they have cer- degrees of elasticity by which their particles, after being laced, tend to recover their original positions: these pro- s exist in bodies in different degrees.

the case of direct impact, the body struck, if previously t, is put in motion; and, if in motion, its movement is ly accelerated or retarded; but in the case of oblique both bodies being in motion, their velocities and the s in which their centres of gravity were moving are d, and there may be produced rotatory motions about centres.

n a body in motion strikes another, whether at rest or vement, the particles of the first body, at the place of ct, have their forward motions retarded; in consequence ich the particles immediately behind approach closer to in front than they were before the impact, and thus a sation takes place. This condensation gives rise to an on of the force of elasticity, which acts against the suc- g particles, retarding the motions of these last and giving a new condensation and a new exertion of elasticity t the next succeeding particles; and so on. The like s must be understood to take place in the body struck; hese actions continue in both bodies till the latter have ed the state of greatest compression; when, for a mo- , both may be conceived to move with a common velocity. this, the force of elasticity overcoming the force of ression, the particles of both bodies gradually return to manent state; which, if the elasticity were perfect, d be the same as that in which they were before the ct: the force of restitution thus causing the bodies to rate as if repelled from each other. A certain interval e elapses between the instants of first contact and sepa- n, but this is so short as to be scarcely sensible.

the striking bodies have spherical forms so that the con- take place, at the first instant, in a point, their sur- about that point will have their figures changed; and if bodies have different degrees of hardness, an indentation place in that which is the least hard, the other pe- to a certain distance in it. When the bodies are balls of wet clay, the change of figure produced by is manifest; but when two balls possess an elasticity is nearly perfect, they so far recover their original re after impact, that the change is not perceptible; it may be rendered evident however on covering one of the spheres with ink and suffering it to impinge on the other, the latter then receives a stain which, instead of being a point, is a circle of sensible magnitude; and this proves that the surfaces must have been flattened at the point of impact.

In order to account for the effect of percussion in impelling a body, a wedge for example, being much greater than that of mere pressure, it may be observed that both effects depend on the product of the mass of the impelling body and its velocity: but, when a body moves in consequence of pressure, the velocity is extremely small; therefore, in order that the effect of simple pressure may be equal to that of percussion, the mass imposed must be very great. It is evident, however, from what has been said, that the two forces are of the same nature. It should be added, here, that the shock produced in a material, when divided by a wedge, or penetrated by a nail, either of these being driven with a force produced by a sudden blow of a hammer may, by displacing the particles of the material, diminish their cohesive power; and this may be, in part, the reason that the effect of percussion often exceeds that of a weight many hundred times greater than that of the hammer.

The force of elasticity is very different in different bodies: spheres of glass are those in which the force of restitution (after impact) approaches nearest to the force of compression; and, in such spheres, the ratio between the forces is as 15 to 16: in spheres of ivory the ratio is as 8 to 9; and in spheres of steel, as 5 to 9. In investigations relating to collision the force of elasticity is represented by a fraction whose numerator and denominator have to one another the ratio of the force of restitution to that of compression; and, if a body were perfectly elastic, this force would, of course, be represented by unity.

The bodies upon which experiments on collision are usually made are generally of a spherical form; in order that when they impinge upon one another directly it may be indifferent at what part of the surfaces of the bodies the contact takes place: the bodies are usually suspended by a string or rod from fixed points; and they are made to impinge upon one another while describing circular arcs, in a vertical plane, about the point of suspension. The absolute momentum, or quantity of motion in a body, is represented by the product of its mass and the velocity with which it is moving: but the effects of the collision of two bodies depend on their relative velocity, or that with which they approach to, or move from, one another; this is, the sum of the absolute velocities when the bodies, in approaching each other, move in opposite directions, and the difference when they move in the same direction.

The formulæ for the velocities of two bodies, elastic or inelastic, after collision, may be readily determined by the following process:—Let m and m' be the masses of two bodies in motion with different velocities and in the same direction: let V and V′ be the velocities at the moment of impact; v and v' the velocities after impact. Then $m\mathrm{V}$ and $m'\mathrm{V}'$ will be the momenta of impact, mv and $m'v'$ the momenta after impact. Also let P represent the force of percussion, or the momentum lost by the striking body and gained by the body struck in consequence of the impact. Then $\frac{m\mathrm{V} - \mathrm{P}}{m}$ and $\frac{m'\mathrm{V}' + \mathrm{P}}{m'}$ will express the accelerative force of impact; and, by Dynamics, these are respectively equal to $\frac{dv}{dt}$ and $\frac{dv'}{dt}$ (t being the duration of the shock).

From the equations thus formed we have by addition,

$$mdv + m'dv' = (m\mathrm{V} + m'\mathrm{V}')\,dt.$$

This being integrated, and the constant determined by the condition that when $t = 0$, $v = \mathrm{V}$, and $v' = \mathrm{V}'$, we get

$$m\,(v - \mathrm{V}) + m'\,(v' - \mathrm{V}') = (m\mathrm{V} + m'\mathrm{V}')\,t;$$

or, considering the second member as zero on account of the smallness of t, we obtain

$$v = \frac{m\mathrm{V} + m'\mathrm{V}' - m'v'}{m}, \text{ or } v' = \frac{m\mathrm{V} + m'\mathrm{V}' - mv}{m'} \quad . \; . \; (\mathrm{A})$$

When the bodies are inelastic, they move together, after impact, with the same velocity: in this case $v = v'$; consequently

$$v = \frac{m\mathrm{V} + m'\mathrm{V}'}{m + m'}.$$

From the above equations for $\frac{dv}{dt}$ and $\frac{dv'}{dt}$ there may be obtained that which has been designated, for the collision of perfectly elastic bodies, the 'Preservation of Active Forces.' Thus, subtracting the latter from the former, we have

$$dv - dv' = \left(\frac{mV - P}{m} - \frac{m'V' + P}{m'}\right) dt:$$

but, if m follow m', and move with greater velocity, the space described by the former during the shock will be equal to the space described by the latter in the same time together with the depths of the two impressions. Let s and s' be the spaces, x and x' the depths of the impressions for the two bodies respectively; then

$$s = s' + x + x' \text{ and } ds = ds' + dx + dx':$$

but, by Dynamics, $v = \frac{ds}{dt}$ and $v' = \frac{ds'}{dt}$;

whence $dt = \frac{dx + dx'}{v - v'}$.

Representing the coefficient of dt in the above equation by X, and substituting this value of dt, the equation becomes

$$(v - v')\, d\,(v - v') = X\,(dx + dx');$$

which being integrated, gives

$$\tfrac{1}{2}\,(v - v')^2 + \text{const.} = \int X\,(dx + dx').$$

But, at the commencement of the shock, when $x = 0$ and $x' = 0$, the velocities are V and V′; therefore the complete integral is

$$\tfrac{1}{2}\,(v - v')^2 - \tfrac{1}{2}\,(V - V')^2 = \int X\,(dx + dx').$$

Again, at the end of the shock, $x + x' = 0$, and the second member of the equation is zero; therefore

$$v - v' = \pm\,(V - V').$$

In this equation substituting first the value of v, and subsequently the value of v' (at (A) above), we get

$$v' = \frac{2mV \pm (m'V' - mV')}{m' + m} \text{ and } v = \frac{\pm 2m'V' + mV - m'V}{m' + m} : .(B)$$

Note, the lower signs are to be used when the bodies move in contrary directions. After squaring these equations, if the first result be multiplied by m' and the latter by m, we shall obtain, by addition,

$$mv^2 + m'v'^2 = mV^2 + m'V'^2;$$

which is the equation alluded to. It must be observed that the equation does not hold good when the bodies are inelastic; in this case there is always a loss of active force by collision.

By making $V' = 0$ in the equations for v and v' (at (B) above) we may obtain the velocities of two elastic bodies after impact, when the body struck was previously at rest; and in this case, if $m = m'$, or the bodies have equal masses, it will be found that, after the impact, the striking body remains at rest and the body struck moves with a velocity equal to that of the former body at the instant of impact; it follows that, if several equal spheres are placed in contact in one straight line passing through all their centres; on causing the first to be struck by an equal body moving in the same line, the effects of the impact will be destroyed in all the bodies except the last, which will move with a velocity equal to that of the striking body.

It is easy to prove by Dynamics, that the velocity of the common centre of gravity of two bodies m and m' before impact is expressed by $\frac{mV + m'V'}{m + m'}$, and after impact by $\frac{mv + m'v'}{m + m'}$: but, from the above equations at (A) or (B) we have

$$mv + m'v' = mV + m'V':$$

hence it follows that the velocity of the common centre of gravity of two bodies is not altered by collision.

If two spherical bodies move in any plane in different directions and come in contact with each other, their motions after collision may be determined by the parallelogram of forces. Each velocity at the moment of impact being resolved into two, one in the direction of a line joining the centres of the spheres, and passing through the point of contact, and the other in a direction at right angles to this line; the velocities of the bodies in the latter direction will, after the impact, be the same as before; and the velocities, after impact, in the direction of a line joining the centres may be found by the formulæ above for v and v', from the resolved velocities in the same direction before impact. Consequently, compounding these velocities, in the two directions, for each body, there is
obtained the velocity of each body and the dir
motion after the impact.

If an elastic spherical body impinge in any di
plane, the movement of the body after impact
determined by the parallelogram of forces. For
of the plane being supposed to be in a line perp
the plane, and passing both through the point of
the centre of the sphere, also the force of elast
reaction being known; let a line in the direction
motion before impact be taken to represent its v
let it be resolved into two velocities passing throug
of the ball, one perpendicular to the plane an
parallel to it: then, after impact, there may be c
exist two forces, one parallel to the plane and
friction) equal to the resolved force in the sa
before impact, and the other perpendicular to it
force of recoil (which if the elasticity were perfe
equal to the force perpendicular to the plane befo
therefore, by composition, the velocity and directi
pact may be obtained. It is evident that, in the
fect elasticity, the angles of incidence and reflexio
to one another. On this principle may be found t
in which a ball must be impelled that, after refle
plane or from any number of given planes, it m
object.

For investigations concerning the magnitude of
sion on a body struck, the duration of the shock,
of percussive force to that of gravity, see Atwood
on Motion,' Gregory's 'Mechanics,' and Whe
chanics.' Also, for the effects of the collision of b
ever be their forms, see Poisson's 'Traité de Méc
465, &c., seconde edition.

COLLISION OF SHIPS. [SHIPS, P. C.,

COLLO'MIA (from κόλλα, glue), a genus of p
ing to the natural order Polemoniaceæ. It has a
calyx, 5-cleft or somewhat 5-parted; the lobes
linear, equal, entire; the corolla salver-shaped, w
exserted tube, and a spreading 5-parted limb; th
oblong, entire; the stamens inserted towards the
the tube; the anthers ovate-roundish; the cells of
1-2-seeded. The species are annual herbs, with alt
and dense heads of flowers. They are all natives

C. linearis is an erect branched plant, clothed
dular hairs; the leaves ovate lanceolate, quite en
reniform, the upper ones downy beneath; the
shaped, 5-parted; corolla more than twice as long
the cells of the capsule 1-seeded. This plant is
North America, from Lake Winnepeg to the We
The corolla has a reddish tube and a rose-coloured
seeds of this as well as the other species are co
testa, which is composed of a spiral tissue held
inspissated mucus. On the seeds being placed
gum of the mucus is dissolved and the spiral fibres
the surface of the seed.

The species of Collomia are showy plants,
easily cultivated in any common garden soil.
should be sown in an open border in spring.

(Don, *Gardener's Dictionary*.)

COLLUMPTON. [DEVONSHIRE, P. C.]

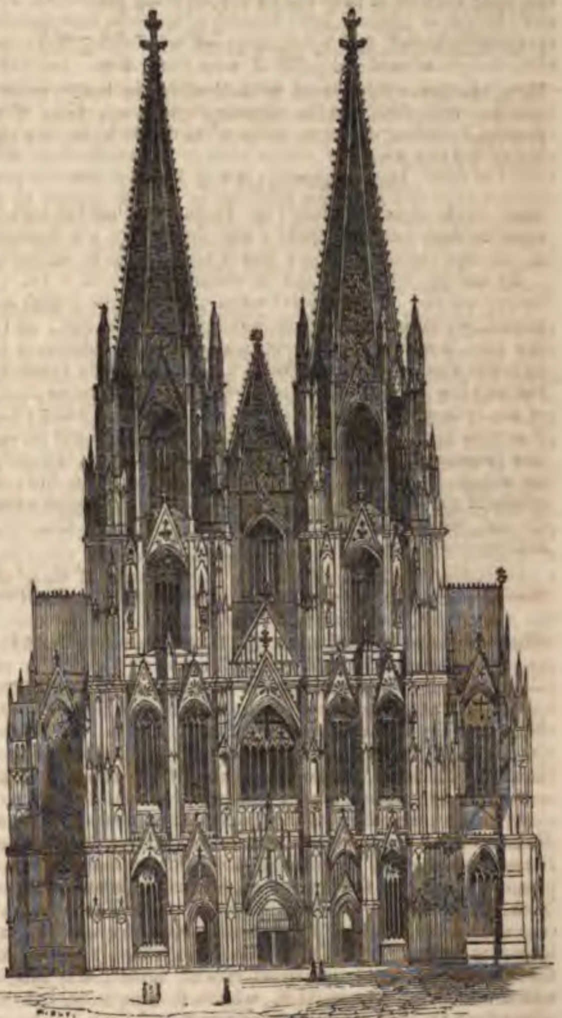
COLOCYNTHUS. [CUCUMIS, P. C.]

COLOGNE CATHEDRAL. The resumptio
lapse of four centuries, of the works of this colo
and most celebrated monument of German Goth
ture, with the intention of fully completing it
originally proposed, is an undertaking not only
itself that it would formerly have been treated as
project, but one that would have been scoffed at
attempt to revive and reinstate a barbarous style
the progress of art and good taste had at length
Europe. The time is not very remote when th
Gothic architecture was looked upon as a merely
one, for which the professional man had no occasio
public no sympathy, whereas it has now become
the taste for it a passion. To the former neglect, if
tion and destruction of Gothic edifices, or if not
tasteless disfigurement of them by modern additio
provements, has succeeded a degree of veneration
them which is one of the characteristics of the nin
tury. Cologne is by no means a solitary instance
the work of restoration and completion has been
some time upon the Continent. In Germany the
of Bamberg, Magdeburg, and Regensburg (Rati
been restored or embellished, and that of Speyer

ut to be similarly treated, and also that at Aachen (Aix-la-
apelle). In France, the abbey church of St. Denis has
reinstated in its pristine magnificence—its walls and
rs, statues and sculptures, profusely decorated with gilding
colours. Even in Italy some attention is beginning to be
to monuments of mediæval architecture: the interior of
Duomo of Florence has lately undergone complete repair
38) by Baccani, and it is now at length seriously intended
mplete the exterior of that structure by erecting a facade.
what has been or is being done here at home, it will suf-
to mention in evidence of the movement in favour of our
n architecture and art—the interior of the Temple church
ondon, and the new Palace of Westminster.

he structure which preceded the present cathedral of
gne was founded by Charlemagne in the ninth century,
erected 816-71. Three centuries afterwards it acquired
t repute throughout Christendom, for possessing the relics
he so-called Three Kings or Magi, which had been
ght from Milan by the Emperor Frederic Barbarossa
n he took that city by storm, in 1170; and highly impro-
le, not to say utterly impossible, as it was that the bones
ll those three persons should ever have been collected
ther and brought over from the East, the legend was a
table one for Cologne: the city became the resort of
rims from all parts of Europe, and most costly presents
e offered up at the shrine of the Three Kings. During
prosperous state of affairs for both the place and the
rch, the structure itself suffered greatly by a fire which
e out in the adjoining one of St. Mary, about 1220, and
royed both the towers of the cathedral, which were only
imber; wherefore it was determined by the then arch-
op Engelbert to erect a new edifice, but his death shortly
r (1225) frustrated the scheme for many years, till it was
ved by Conrad von Hochstaden (archbishop from 1237 to
1), and accelerated by the occurrence of another fire in
8, the 15th of August of which year is recorded as the
of the laying the foundation stone of the new edifice.
o was the architect who conceived a pile upon such an ex-
rdinary scale both as to magnitude and magnificence, will
ably ever remain an historical enigma. That honour has
n claimed by some for a certain Gerard von Trond, but
gh there is direct evidence of his having been honourably
rded for his services, by the chapter, in 1257, it is ex-
dingly doubtful whether he was more than the superin-
dent of the works. The design itself has been attributed
ome to the celebrated Albertus Magnus (1193—1280),
is said to have been no less eminent as an architect
as a schoolman, and to have erected the choir of the
inican church at Freiburg and that of the Dominican
ch at Cologne. Of so colossal a pile the mere founda-
and substructure—extending in some places to the depth
ty feet—were a gigantic work, and the further advance
e building was retarded for many years by dissensions be-
n the archbishop and the citizens, by the papal interdict
Cologne, and the removal of the episcopal residence to
n. It was not until the close of the century that the
ks were resumed, but when they were, they were prose-
d with energy, and the choir was consecrated and opened
ervice, September 27, 1321. But it was not long be-
the zeal began greatly to relax: there were complaints of
peculation on the part of those who had the administra-
of the funds furnished by the pious; and another cause of
rance was that fresh dissensions broke out between the
gy and the townspeople. In the meanwhile however
h was done in adorning the choir and its chapels, and
g other sumptuous embellishments were the statues of
twelve apostles, of silver gilt. This part of the edifice, at
that forming the sanctuary and containing the shrine of
Three Kings, had a narrow escape from destruction in
tober, 1434, when a violent hurricane flung down one of
largest pinnacles, an enormous mass of stone, from the east
d of the church, which not only crushed in the vault of that
pel, but injured the shrine itself. This was of course
ributed to the malice of the Evil One, who had left the
print of his talons on the stone itself. The occurrence
ms to have been ominous, for about three years afterwards
437) the works came to a stop when the southern tower of
west front had been carried up about 200 feet, or the
nded height of the nave, but not half its own altitude.
om that period all idea of continuing the fabric seems to
e been abandoned. The choir was suffered to remain a
pendous fragment at one end, and the tower another at
opposite extremity. Nothing further was done until about the middle of the last century (1743-5) when it had become necessary to put the choir into repair. All that was then and afterwards done, further than absolute necessity required, was of more injury than service, for there existed neither feeling for nor intelligence of Gothic architecture, and accordingly all the alterations were in a vile and discordant taste.

Whatever regret may have hitherto been felt at the condition of a structure so glorious even in its incomplete and maimed condition, it has perhaps been a piece of singular good fortune for Cologne cathedral that no earlier attempt was made to complete it after the decline of the Gothic style, for in that case it would almost to a certainty have proved a very heterogeneous mass; whereas now, we, or at least our posterity, may behold an edifice as thoroughly consistent throughout, if not more so than had it proceeded without interruption for a century later. In 1816 Schinkel was commissioned by the present king, then Crown-Prince of Prussia, to survey and report upon the condition of the cathedral; and in 1824 the restoration of the choir was begun by Bau-inspector Ahlert of Cologne. In 1829 he commenced the repairs of the exterior of the choir and its flying buttresses. Ahlert died in 1833, and was succeeded by Ernst Zwirner (the restorer of the abbey of Altenberg near Cologne), who has prosecuted his important task with earnest affection, and with a most scrupulous fidelity to the character of the original work in regard to the execution of the details. After the interior of the choir had been fully reinstated by him, and embellished with carving and statues, polychromy and gilding, the first stone of the *Neu-bau*, or works for completing the rest of the structure, was laid with great solemnity by the King of Prussia, September 4th, 1842, since which considerable progress has been made with them, four compartments of the south aisle having been finished in 1843, and three others in the following year. Zwirner, it is said, calculates that the whole may be completed in about thirty years, should no stoppage take



Elevation of the West Front of Cologne Cathedral.

alyx silky externally; the drupes oblong, black. The of this plant yields a limpid oil, with a pungent turpen- mell, which congeals into a buttery camphoraceous sub- e. It possesses the same properties as Copaiba. Don 'When the nuts are mature they contain a sweet kernel, h does not become rancid, and which resembles a sweet ut; they are eaten both raw and dressed by the inha- s of the Moluccas, Banda, and New Guinea; and an oil pressed from them, which is used at the table when fresh, r lamps when stale; bread is also made from them, , biscuits, &c., for the table. Eaten fresh they are apt ing on diarrhœas and dysenteries, and to occasion an op- ion at the breast.' The same tree is also said to yield Indian Elemi. It is a native of the continent of India, the islands of the Eastern Archipelago.

, *Gardener's Dictionary*; Lindley, *Flora Medica*.)

LOUR, ACCIDENTAL. [Accidental Colour, S.]

OURS, COMPLEMENTARY, are such as being together give rise to the perception of whiteness.

Newton having, in a dark room, received upon prism a pencil of light from the sun, intercepted the d pencil by a glass lens; then on placing a screen of paper, at first immediately beyond the lens, he observed solar image was strongly tinted with all the pris- colours, violet, indigo, blue, green, yellow, orange, [Dispersion, P. C.]: on removing the screen farther e lens, the different bands of colour approached the axis of the latter; and at the focus of the lens, complete mixture of the colours, a white spot was . Afterwards, on intercepting at the surface of the e violet, blue, and green rays, the spot on the screen to be white, and assumed a colour compounded of ow, orange, and red rays which remained: again, on ting the red and violet rays, the colour became com- d of the remaining rays, yellow, green, and blue, and

, if a tint complementary to any one of the seven c colours were required, so that by the mixture of o a perfect whiteness might be produced, that tint be compounded of the six which remain when the olour is removed; but a degree of whiteness which hes as near the perfect state as may be in general y is obtained by the mixture of blue, yellow, and red; equently a colour complementary to one of these produced by the mixture of the two others merely. ur complementary to red is therefore a green composed w and blue; that which is complementary to orange re of red and yellow) is blue: the colour comple- y to yellow is violet, which is compounded of red and The corresponding colours in the columns of reflected smitted tints [Colours of Plates, P. C. S.], among are black and white, the former resulting from the e of all reflected or transmitted rays, are comple- ry to one another.

circular plate of metal or of stiff cardboard be divided, s drawn from the centre, into seven sectors whose s are proportional to the numbers 125, 75, 133, 167, 1, 222, which are nearly the proportions that the s of the several bands of colour, beginning with the ar to one another in the solar spectrum; and these be coloured conformably to those bands; upon making te revolve rapidly about an axis passing through its , white light will be produced by the blending of the coloured rays. Again, if any one of the sectors be d with black paper; on making the plate revolve, the of the light produced by the rays from the uncovered will be complementary to that of the former sector.

LOURS OF PLATES are those variously tinted rings s which appear when light is transmitted through or d from the surfaces of a lamina formed of any trans- medium. When the laminæ are extremely attenuated, lours are said to be those of 'Thin Plates;' if the s exceeds a tenth of an inch, they are designated the s of 'Thick Plates:' and when between two plates of here is interposed a film of some liquid, the colours are those of 'Mixed Plates.'

e colours of thin plates were first examined by Sir Isaac n; and this philosopher, in order to observe them con- ly, placed two convex lenses of long foci (14 and 50) in contact with each other at their vertices, keeping together by means of three clamps at intervals on their ferences, so that there was between them a very thin plate of air concave on its upper and lower sides. On bringing the pair of lenses to an open window, and receiving the rays of light from the sky by reflexion from them, there were observed, the plates being gently pressed together, seven series of coloured rings or bands about a black spot in the centre: beyond the seventh band the colours could scarcely be distinguished. The diameters of the bands being measured, where the colour in each was the brightest, Newton found that those diameters were proportional to the square roots of the series of odd numbers 1, 3, 5, 7, &c.: at the places where the colours were the least bright, the diameters were found to be proportional to the square roots of the series of even numbers 2, 4, 6, 8, &c. The radii of the curvatures of the lenses being known, Newton computed the thicknesses of the plate of air at the circumferences in which the colours of the bands had the greatest and least degrees of brightness; and he found (*Optices*, lib. ii.) that, at the most luminous part of the ring nearest to the centre, the thickness was equal to $\frac{1}{178000}$ inch: the thickness at the most obscure part of that ring was equal to $\frac{2}{178000}$ inch. Hence, from the law above mentioned, the thicknesses of the air at the most and least luminous parts of the succeeding rings may be obtained; these thicknesses being considered as proportional to the semidiameters of the rings.

If lenses whose surfaces have different curvatures are employed, it is always found that like tints are produced in the circumferences of circles at places where the intervals between the surfaces are equal, the eye being similarly situated, or a line supposed to be drawn to it from the centre making equal angles with a plane passing through all the rings; and this circumstance serves to show that the tints depend wholly on the distances between the lenses. If the angle made by the line drawn to the eye be diminished, the diameters of the rings will be increased, the tints remaining the same; and Newton has given a rule for determining, when the angles of incidence are oblique, the interval between the lenses at the place where any particular tint is produced.

When the rings are formed by homogeneous light they are found to be more numerous than when the light is mixed; they are also of the same colour as the light, and are separated from one another by narrow spaces which are quite black. The diameters of the rings in the corresponding bands, at the places where the colours are the brightest, are different when the bands are formed by homogeneous lights of different colours, being least when the light is violet, and greatest when red; and Newton computed, from the measured diameters of the rings of different colours, the intervals between the lenses at the places where the brightest parts of the first rings from the centre are formed: these distances are found to be equal to $\frac{1}{75180}$ inch for extreme red rays, and $\frac{1}{119500}$ inch for extreme violet rays, or to half the lengths of an undulation for the different kinds of light.

The order and the dimensions of the coloured rings are the same, whether air occupy the space between the lenses or whether the latter be in the exhausted receiver of an air-pump: but when a transparent medium, as water, of greater refractive power than air is interposed between them, the tints are fainter and the diameters of the rings are less; or smaller distances between the lenses are requisite in order to produce the same tints: it is ascertained that, with different media, these distances are inversely proportional to the refractive indices.

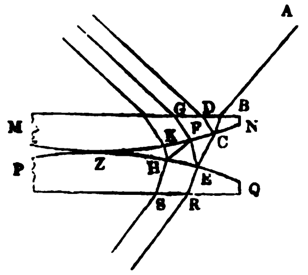
Corresponding rings of colour were observed by Newton in thin plates surrounded by media less dense than the plates: thus a bubble of soap-water exhibits, by the gradual subsidence of the fluid, rings of colour exactly conformable to those between glass lenses; and, before the bubble bursts, a dark spot, about half an inch in diameter, is formed at its upper part. The like phenomena have been observed in thin plates of mica and in bubbles of glass blown so thin as to burst.

Newton also examined and described the phenomena of the coloured rings or bands between lenses when the light is transmitted through the latter. These rings are less bright than those which are formed by reflexion; but when the obliquity of the transmitted rays to the plane of the rings is considerable they are sufficiently distinct: in the centre is a white spot, and the colours of all the rings are exactly complemental to those of the corresponding rings which are seen by the reflected rays. Newton's arrangement of the coloured tints in the first and second rings or bands, reckoning from the centre, is given in the following table, with the thicknesses of the plates of air, water, and glass, at the places where the tints are produced. The unit of measure is one millionth part of an inch.

Number of the Band.	Reflected Tints.	Transmitted Tints.	Air.	Water.	Glass.
I.	Very black	. .	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{10}{31}$
	Black	White	1	$\frac{3}{4}$	$\frac{20}{31}$
	Nearly black	. .	2	$1\frac{1}{2}$	$1\frac{2}{7}$
	Blue	Yellowish red	$2\frac{2}{5}$	$1\frac{4}{5}$	$1\frac{11}{22}$
	White	Black	$5\frac{1}{4}$	$3\frac{7}{8}$	$3\frac{2}{5}$
	Yellow	Violet	$7\frac{1}{9}$	$5\frac{1}{3}$	$4\frac{3}{5}$
	Orange	. .	8	6	$5\frac{1}{6}$
	Red	Blue	9	$6\frac{3}{4}$	$5\frac{4}{5}$
II.	Violet	White	$11\frac{1}{6}$	$8\frac{3}{8}$	$7\frac{1}{5}$
	Indigo	. .	$12\frac{5}{6}$	$9\frac{5}{8}$	$8\frac{2}{11}$
	Blue	Yellow	14	$10\frac{1}{2}$	9
	Green	Red	$15\frac{1}{2}$	$11\frac{2}{3}$	$9\frac{4}{5}$
	Yellow	Violet	$16\frac{3}{7}$	$12\frac{1}{3}$	$10\frac{2}{5}$
	Orange	. .	$17\frac{2}{3}$	13	$11\frac{1}{5}$
	Bright red	Blue	$18\frac{1}{3}$	$13\frac{3}{4}$	$11\frac{5}{6}$
	Scarlet	. .	$19\frac{2}{3}$	$14\frac{3}{4}$	$12\frac{2}{3}$

This table, extended so as to include the seventh band of reflected tints, constitutes that which is called Newton's Scale of Colours.

It was to explain the phenomena of coloured rings or bands that Newton proposed the hypothesis of 'Fits of Easy Reflexion and Transmission' [UNDULATORY THEORY OF LIGHT, P. C., p. 511], and on that hypothesis the phenomena may be very satisfactorily accounted for. The following expressions for the places of the rings are, however, obtained from the principles of the undulatory theory.



Let MN PQ be two plates or spherical lenses, either plano or doubly convex, in contact with each other at Z; and let AB be the direction of a pencil, or of a wave of light incident upon the first or upper plate: this will be refracted in some direction as BC, and at the point C part of the pencil will emerge and fall on the other plate in some point E, where it will be partly transmitted through that plate in the direction ER, and partly reflected in the direction EF. Another part of the refracted pencil BC will be reflected at C in the direction CD, some of it emerging at D, and the rest being reflected back into the plate. The reflected pencil EF will also be, in part, transmitted through the upper plate in some direction as FG, and, in part, reflected in the direction FH: at the point H a portion will be transmitted in the direction HS, while another is reflected in the direction HK, and so on. Thus it is easy to perceive that the rays in the incident pencil will, by their interferences, produce the phenomena of coloured rings, both by reflexion and transmission, about the point of contact of the two lenses.

In Airy's 'Mathematical Tracts' (Undulatory Theory, article 65) it is shown that, if β be the angle of incidence at B, γ the corresponding angle of refraction, a the co-efficient of the formula for a vibration in the incident pencil, e the multiplier of the same co-efficient for the refracted vibration, and D the distance between the plates; the formula for the intensity of the reflected light is

$$\frac{4a^2e^2\sin.^2\frac{\pi}{\lambda}V}{(1-e^2)^2+4e^2\sin.^2\frac{\pi}{\lambda}V}$$

where $\pi = 3{\cdot}1416$, λ is the length of a wave, which, it may be observed, is equal to twice the length of a 'Fit' for each kind of light, and V represents 2D cos. β.

From this formula it is manifest that when $D = 0$, the intensity of reflected light vanishes, whatever be the value of λ; therefore, when two plates are in contact, and for a like reason when a soap-bubble is at the point of bursting, a black spot appears. The reflected light vanishes when $V = 0$, or when
it has any of the values $\frac{2}{2}\lambda$, $\frac{4}{2}\lambda$, $\frac{6}{2}\lambda$, &c.; consequently
two lenses, at distances from the point of contact who
are in the proportion of 2, 4, 6, &c., there will be
Also the intensity of the reflected light is grea
$V = \frac{1}{2}\lambda$, $\frac{3}{2}\lambda$, $\frac{5}{2}\lambda$, &c., or when the squares of the dist
the point of contact are in the proportion of 1, 3, 5,
both these series of distances are conformable to o
In the same tract (article 67) it is also shown th
tensity of light refracted through the second plate is
by

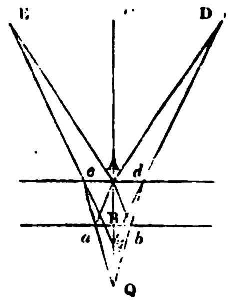
$$\frac{a^2(1-e^2)^2}{(1-e^2)^2+4e^2\sin.^2\frac{\pi}{\lambda}V}$$

The sum of the two expressions is always equal t
proves that the reflected and refracted tints are com
to one another, conformably to observation.

Sir Isaac Newton also discovered that when a sle
of light issuing from the sun is reflected from the c
face of a glass mirror of the kind called concavo-c
receiving the reflected pencil on a screen at the f
mirror, a hole being made in the screen to let the
through, four or five concentric rings of colour are
these are called the colours of thick plates, and they
to those which are formed by transmission through
of air, as above mentioned. The reflected rings
duced whether the back, or convex surface, of the
silvered or not, but in the latter case they were
they were not produced by reflexion from a metallic

When the light was homogeneous all the rings w
colour, and the squares of the diameters of the mo
parts of the rings were in the proportions of the
4, 6, &c., while the squares of the diameters of the d
were as the numbers 1, 3, 5, &c. On using glass mi
ferent thicknesses, Newton found that the diame
rings were inversely as the square roots of the thi
the mirrors.

The cause of these coloured rings, as explained b
Newton, is a scattering of the rays in a pencil of
it enters a refracting medium, as glass, with a polis



Thus, if a pencil of rays proceeding from C fall
larly on the surface of glass, the greater part of t
directly through the medium to B, and are ref
thence back in the line BA to C; but many of t
entering the glass at A, are scattered (on accoun
larities in the polished surface) in different directi
Ab: these rays are reflected at the opposite su
glass in directions such as ac, bd, as if they came f
tain point Q; and, in passing from the glass to the
refracted as if they came from a certain other point q:
time many of the rays reflected in the direction BA,
at A, are scattered (as the incident rays were scat
same point) in different directions, as AD, AE, so
the rays reflected from such points as a and b.
the difference between the lengths of the lines dir
A and Q is equal to a multiple of $\frac{1}{2}\lambda$, or half an
the waves of light are in opposite phases, and c
destroy each other's effects; while, in the interva
these, coloured spaces form themselves by the mi
waves: as this takes place conically about the axis
evident that the interferences will form a number o
dark rings on a screen placed so as to receive the
places of convergence. If the medium from which
is reflected be a concavo-convex mirror, it is evide
interfering rays from a number of incident pencil
from the centre of curvature will cause the colo
between the dark rings to have considerable bright

By an analysis which may be seen in the 'T
Light,' by Sir John Herschel ('Encyclopædia Me

it is shown, on the undulatory hypothesis, that the
diameters of the alternate bright and dark rings is
le to that which was determined by Newton.
ncil of light from the sky pass through a circular
nd fall nearly perpendicularly upon a plate of glass
llel surfaces, and if after transmission the rays be
fall on a plate of glass of equal thickness but in-
he former at a small angle; the direct image of the
ıfter transmission through the second plate, will be
olour; but, besides this image, there will be others
produced by the light passing through the second
two, four, &c. internal reflexions. All these
ages except the first are so faint as to be scarcely
t that first is observed to be traversed by fifteen or
ırallel fringes or bands: the three which are nearest
ıtre consist of blackish and white stripes, and the
bright bands of red and green light: the fringes
parallel to the common sections of the surfaces of

ıhenomena were first observed by Sir David Brew-
ın account of them is given in the 'Edinburgh Phi-
Transactions,' vol. vii. The cause is ascribed to
ıat some of the rays in the several reflexions, after
the plates and the interval between them, will differ
ı length of route as to be incapable of interfering
ınother; while others will differ in this respect by
l quantities, and therefore, by their interferences,
ıce colours. Sir John Herschel calls such bands
tic lines, or lines of equal tint.
ung, looking at a luminous object through two plates
aving a little moisture between them (mixed plates)
about it fringes of colour like those which are seen
ıtes: and he found, on receiving the rays reflected
glass, that fringes were formed in the same directions
ers, but many times larger. When a lens of long
laid upon a piece of plate glass, with a little grease
hem, he observed, on looking at the edge of a bright
eries of concentric rings, in which the tints on one
diameter corresponding to the edge of the object
plementary to those on the other side: the diameters
rs were found to vary with the refractive power of
liminishing as that power increased.
ids between the plates were water intermixed with
f air, oil mixed with water, and the like; and Dr.
ribes the formation of the colours to the interference
es of light in consequence of the difference of velo-
which they move in the two different kinds of fluid
he plates.

CHOUN, PATRICK, a statist and political econo-
born at Dumbarton on the 14th of March, 1745.
rs to have in his youth struggled with difficulties
evented his receiving a liberal education. At an
od of life—apparently when he was little more than
ars old—he endeavoured to push his fortune in the
Virginia. In 1766 he returned to Scotland and
Glasgow, where he subsequently became instru-
the establishment of a coffee-house or news-room,
ınge, the Chamber of Commerce, and various other
titutions. He afterwards visited the Continent with
of making his countrymen acquainted with the
textile fabrics which would give our manufactures
hances of success in the continental markets; and
quent rise and progress of our muslin trade are said to
produced by his exertions on that occasion. In
ettled in London, where he soon afterwards directed
ion to the important question, whether the various
stems of the metropolis were as efficient as they
made towards the accomplishment of their legitimate
suppression of crime. He was one of the three
ry justices of peace appointed in 1792. In 1796 he
his well known work, 'A Treatise on the Police of
ropolis, explaining the various crimes and misde-
which at present are felt as a pressure on the com-
ınd suggesting remedies.' In a letter to Lord Col-
n 1798, Bentham states that 7500 copies of this work
been sold. Although changes both in the police
ns and the state of society have superseded the in-
contained in this work, it is still frequently referred
ts statistical data, and views of the proper principles
regulations, had much influence in the furtherance of
rm of the metropolitan police which took place so
rs after the book was published. In 1800 he drew,
assistance of Bentham, of whom he was a valued friend, the Thames Police Act—40 Geo. III. c. 87, a measure now understood to have been suggested by Mr. Harriot. In the same year he published 'A Treatise on the Commerce and Police of the River Thames: containing an Historical View of the Trade of the Port of London: and suggesting means of preventing the depredations thereon, by a legislative system of River Police.' Mr. Colquhoun was a great promoter of the system of charity-schools, holding the opinion, which is every day obtaining additional adherents, that the education of the people is the main protection of society from those social evils which penal legislation can but partially cure when they have broken out. He died on the 25th of April, 1820. There is a memoir of him in the 'Gentleman's Magazine,' and he is frequently mentioned in Bentham's works.

COLUMBA, commonly called the Apostle of the Highlanders, or Scoto-Irish, is believed to have been one of the earliest teachers of Christianity in Scotland, and is known in history as the founder of the abbey and college of Iona in the Western Isles. He was a native of Ireland: his biographers give his pedigree with great precision, but even if its precise accuracy could be trusted, its repetition here would afford the reader nothing more valuable than a series of strange names. He is said to have been born in the year 521. According to the best collations of recent investigators, he arrived in Scotland in the year 563. The island of Hi, or Iona, where he established himself with his disciples, may be presumed, from the vestiges of a worship earlier than Christianity still extant there, and commonly called Druidical remains, to have been a seat of the pagan worship of the day, and it is probable that Columba desired to attack the lion in his den. The greater part of the neighbouring west coast of Scotland was peopled by the Scots, who had emigrated from Ireland; the districts south of Iona, and the broad tracts of comparatively level land stretching eastward, were inhabited by the people called Picts. Columba is said to have established an equal influence with both races. In the much debated question whether the Picts were of Celtic or Teutonic origin, a passage in Adamnan's Life of Columba gives perhaps the most distinct, though very limited, evidence that exists on the subject. It states that Columba, who as an Irishman must have been of the same Celtic origin as the Scots or Irish Dalriads who surrounded him on the west coast, required an interpreter when he communicated with the king of the Picts. The Life of Columba by Adamnan is a work frequently consulted by investigators into the early history of Christianity in Britain. An accurate list of the various shapes in which this little book has been reprinted will be found in the Life of Adamnan in the Biographical Dictionary of the Society for the Diffusion of Useful Knowledge. A translation of this work, with critical comments, was published in 1798, with the title 'The Life of St. Columba, the Apostle and Patron Saint of the antient Scots and Picts,' by John Smith, D.D., a work full of very absurd blunders. Adamnan's Life contains few biographical facts which can be depended on, but it is a very curious memorial of the manners of the day. Even the dreams and miracles with which it is crowded are instructive when critically examined. Columba is believed to have been the founder of the Culdees [Culdees], and in connection not only with them, but with the pagan rites which he superseded, his memory is traditionally preserved in the highlands of Scotland. There is a Highland proverb, of which the translation is—'Earth, earth, on the mouth of Oran, that he may blab no more.' The tradition connected with this is, that Oran was one of the followers of Columba, who, as a sacrifice at the building of Iona, was buried, whether alive or dead is not stated. This tradition, which is given as the version of the pagan priests, says that Columba opened the grave three days afterwards, and Oran told him that hell was not such a place as he reported it to be. Whereupon Columba, to prevent his impiously communicating the idea to others, called out to those who were with him in the words of the proverb. Columba is said to have died in the year 597. There is an account of his life in Chalmers' 'Caledonia,' i. 311, and in Jamieson's 'Account of the Culdees.'

CO'MARUM, a genus of plants belonging to the natural order Rosaceæ. It has a concave 8-10 parted calyx in two rows, the five exterior sepals being smallest; 4-5 petals; the receptacle ultimately large, fleshy, spongy, and persistent; the style lateral near the summit of the nut, the seed ascending. There is but one species of this genus, C. *palustre*, Marsh Cinquefoil. It has an ascending stem, is about one foot high, has pinnate leaves, dark purple flowers, and numerous carpels seated on the dry spongy receptacle. This plant is a native of Great Britain. It is found in marshes and peaty bogs. The fruit is called in Scotland Cow-berries. The roots dye wool of a dirty red colour, and possess a sufficient amount of tannin to render them available for making leather. In gardens it will grow in any moist soil, and may be increased by dividing at the root.

(Babington, *Manual*; Don, *Gard. Dict.*)

COMB. Combs are generally made of a thin plate of wood, horn, tortoise-shell, ivory, bone, or metal, which may be either flat or curved, having one or two of its edges indented with narrow slits, which divide the substance of the comb into long, fine, pointed teeth. Combs employed in the woollen manufacture, for disentangling the fibres of wool, which contain two or more rows of metal teeth, not formed by cutting the edges of a plate, but by inserting the teeth in a stock of wood or other material, and cards and carding-machines, which consist of many such rows of wire teeth fixed together, so as to form what may be styled a brush of metallic combs, are described under WOOLLEN AND WORSTED MANUFACTURES, P. C., pp. 551-554, COTTON SPINNING, P. C., p. 95, and CARDS, P. C. S., p. 289. Somewhat similar to the last are the curry-combs used in dressing horses, which consist of a number of iron plates notched on one edge to form saw-like teeth, and attached by the other edge to an iron back, in parallel lines, so as to form an instrument the action of which is between that of a scraper, a comb, and a brush.

In the mode of cutting and shaping the plates of which combs are formed there is little to call for remark, but in the act of comb-cutting or comb-parting, by which the teeth are cut of a uniform size, at equal and often very minute intervals, and, in many cases, of extreme thinness or fineness, much ingenuity has been called into exercise. The old method of forming the teeth was by means of a double saw, consisting of two separate fine saws, placed parallel with each other, and adjusted to such a distance from each other as to embrace a tooth of the required fineness between them. These two saws are so arranged that while one cuts into the comb to the full depth required, the other cuts only about half that depth, and by this contrivance the uniformity of the comb is secured, because, while the deeper saw is completing the first cut, the shallower one is forming the commencement of the second, and when, on the completion of the first cut, the deep saw is put into the second cut to complete it, the shallower one immediately commences a third. The cuts thus formed are subsequently enlarged and rendered smoother by means of a very thin wedge-shaped file, which also points the teeth. With such accuracy may these operations be performed, that delicate ivory combs, with from fifty to sixty teeth in an inch, are produced in this way. Though this method of comb-cutting is still practised, a superior and much quicker mode of performing the same operations by means of circular saws and revolving cutters for pointing the teeth has been long in use; a machine for this purpose, having a series of saws or cutters fixed upon one axis, with washers between them to regulate the distance of the cuts, and consequent size of the teeth, having been patented by Mr. Bundy as early as 1796.

By the above-described modes of comb-cutting all the material of the interstices between the teeth is lost or destroyed, but by the operation known as the *parting* of combs such loss or waste of material may be avoided in the manufacture of combs of tortoiseshell, horn, or any other tough material; two combs being, by this process, made out of one piece, the teeth of one being cut, by the pressure of chisel-like instruments, out of the interstices of the other. According to a paper in the forty-ninth volume of the 'Transactions' of the Society of Arts, descriptive of the improved machine contrived for this purpose by Mr. Rogers, this ingenious mode of forming combs was invented by an artisan named Ricketts, who was led to the invention by being engaged in the production of ornamented tortoiseshell combs in which the decorative parts were formed by the pressure of cutters. The name of Ricketts is not referred to in the articles on comb-making in Dr. Ure's 'Dictionary of Arts' and Hebert's 'Engineer's and Mechanic's Encyclopædia,' but both those works contain a notice, and the latter an engraving also, of a machine for performing this operation, which is described as the invention of Mr. Lyne. In this machine, the various motions of which are effected by the alternating action of a lever handle, the piece of tortoiseshell or horn which is to be converted into a pair of combs is secured upon a traversing carriage, which is capable of motion in a direction perpendicular to that of the teeth of the comb, by means of a screw turned by a ratchet-
wheel, which is advanced one tooth by each movem
lever, and which, by varying the size of the ratc
may be made to move the carriage more or less acc
the intended breadth of the teeth of the comb. Thi
is made hollow, to receive an iron heater, the heat
softens the horn, and thereby renders it more easy to
tween each movement of the carriage the cutter, w
chisel equal in breadth to the length of the intended te
comb, is brought down with sufficient force to cut c
through the horn or tortoiseshell. As the teeth a
quired to be perfectly parallel, but in a slight degre
shaped, the successive cuts of the chisel must incli
obliquely, first in one direction, and then in the
which provision is made by an arrangement for a
changing the position of the cutter during its des
pair of very narrow chisels mounted at right angles
at the ends of, the long cutter, serve, by their alte
scent, to connect each pair of cuts at their convergi
mities, so as to detach the ends of the teeth. In
quent improvement of the parting process two cut
employed, set permanently at the required opposit
of obliquity, and having returns to liberate the en
teeth. In Mr. Rogers's engine, above referred
obtained a prize from the Society of Arts in 1833,
quired movements are obtained by very simple mea
thing being effected by the continuous turning of
which, by means of a crank, works a double cutter
chisels of which are capable of adjustment accordin
size of the teeth, while the screw for moving the b
riage is turned by means of a cog-wheel upon its ax
ing into another on the axis of the winch. The
motion between each operation of the cutter is reg
varying the relative sizes of these cog-wheels; and
sation of the motion of the carriage during the op
the cutter is provided for by removing the cogs from
of the circumference of one of the wheels. For the
working two of the principal materials of combs,
and TORTOISESHELL, P. C. S.

COMBINATION LAWS. The laws known
name were repealed in 1824. Till then any co
of any two or more masters, or of any two or mo
men, to lower or raise wages, or to increase or
the number of hours of work, or quantity of wor
done, was punishable at common law as a misde
and there were also thirty-five statutes in existen
of them applying to particular trades, prohibiting
tions of workmen against masters. The act passed
(5 Geo. IV. c. 95) repealed all the statute and
law against combinations of masters and of workmen,
a summary mode of conviction, and a punishment no
ing two months' imprisonment for violent interfere
workmen or masters, and for combinations for viole
ference; and contained a proviso with regard to com
for violent interference, that no law in force with r
them should be altered or affected by the act. But
common law against combinations being repealed by
this proviso was considered as of no force: and the
went beyond the intentions of the framers in legali
binations unattended with violence for the purpose
trolling masters in the mode of carrying on their tr
manufactures, as well as peaceable combinations to
advance of wages or reduction of hours of work.
was passed after an inquiry into the subject by a co
presided over by Mr. Hume, which reported to the h
following among other resolutions:—

'That the masters have often united and combined
the rates of their workmen's wages, as well as to re
mand for an increase, and to regulate their hours of
and sometimes to discharge their workmen who w
consent to the conditions offered to them; which ha
followed by suspension of work, riotous proceedings,
of violence.

'That prosecutions have frequently been carried o
the statute and the common law against the workm
many of them have suffered different periods of impri
for combining and conspiring to raise their wages, or
their reduction, and to regulate their hours of working

'That several instances have been stated to the co
of prosecutions against masters for combining to lowe
and to regulate the hours of working; but no insta
been adduced of any master having been punished
offence.

'That it is the opinion of this committee that mas rkmen should be freed from such restrictions as regard the e of wages and the hours of working, and be left at perfect rty to make such agreements as they may mutually think per.

'That therefore the statute laws which interfere in these ticulars between masters and workmen should be repealed; also that the common law, under which a peaceable meet- of masters or workmen may be prosecuted as a conspiracy, ld be altered.'

mmediately after the passing of this act a number of widely nized and formidable combinations arose in various trades manufactures for the purpose of controlling the masters as e way in which they should conduct their business; and extent to which the act had repealed the common law g doubtful, and the act having clearly gone beyond the ations on which it was grounded in legalizing combina- s, Mr. Huskisson, then President of the Board of Trade, ed early in the session of 1825 for a committee to consider effects of the act 5 Geo. IV. c. 95; and a committee was inted with Mr. (afterwards Lord) Wallace, then Vice- ident of the Board of Trade, for its chairman. This mittee recommended the repeal of the act of the previous on, and the enactment of another: and in consequence of r recommendation the 6 Geo. IV. c. 129, was passed, which e act now in force relative to combinations.

his act repealed the 5 Geo. IV. c. 95, and all the statutes h that act had repealed. It relieved from all prosecution punishment persons meeting solely to consult upon rate ages or hours of work, or entering into any agreement, l or written, on these points. And it provided a punish- t of not more than three months' imprisonment, with or ut hard labour, for any one using violence or threats to e a workman leave his hiring, or return work unfinished, or e to accept work, or belong to any club, or contribute to common fund, or pay any fine for not belonging to a club, ntributing to a common fund, or refusing to conform to rules made for advance of wages or lessening of the hours ork, or regulations of the mode of carrying on any busi- , and for any one using violence to make any master alter ode of carrying on his business.

the act 6 Geo. IV. c. 129, therefore, combinations of n and workmen to settle as to rate of wages and hours of r are made legal and freed from all punishment: but the n law remains as it was as to combinations for otherwise lling masters.

9 Geo. IV. c. 31, assaults in pursuance of a combination e the rate of wages are made punishable by imprison- nd hard labour.

ommittee of the House of Commons sat in 1838, pre- over by Sir Henry Parnell, to consider the effect of nations of workmen; but nothing followed from this ittee.

OMBRETA'CEÆ. [Terminalia, P. C.]

OMBUSTION, a process in which both light and heat itted by chemical agency: thus, when a piece of char- is ignited and put into oxygen gas, combustion com- es, and continues with increasing brilliancy until the oal disappears, or the oxygen has undergone a change h renders it incapable of further action as a supporter of ustion.

the same way, if we ignite a slender piece of iron and erse it in oxygen gas, much light and heat are given out he combustion of the iron; the gas disappears, and the , by combining with it, has acquired a new form and erties, or, in other words, it is converted into oxide of .

hese two cases will exhibit instances of the more import- changes which accompany combustion: in the first a solid y, charcoal, by combining with oxygen, becomes gaseous, g converted into carbonic acid gas, and the oxygen, gh it still retains its gaseous form, is found to be so rely altered in properties, that it is no longer capable of porting life or combustion, but is soluble in water, and ipitates carbonate of lime from lime-water.

n the second example, unlike the first, the oxygen does retain its gaseous form, nor does the iron, like the char- l, lose its solid form, being, as already stated, converted oxide of iron, which is a solid body.

istinction is then to be made between *combustion* and tion. In the former, heat and light are elicited by che- l agency; but the substances by which it is produced ergo so complete a change of properties, that if we were to t fresh charcoal in the carbonic acid gas resulting from the combustion of the first piece, no combustion would again occur: so also, if the oxide of iron obtained in the second case were heated in a fresh portion of oxygen gas, neither would suffer any change of properties, or give out any light or heat by chemical agency.

It is however well known that if certain bodies, such as a mass of oxide of iron or a stone, be ignited, it will continue to give out both light and heat for a longer or shorter period, according to the cooling power to which it is exposed. But in this case the *ignited* oxide of iron or stone gives out the light and heat which it had previously received from the contact of bodies in *combustion*.

It is then to be understood, that while *incombustible* bodies which have been ignited yield only the light and heat which they had previously received from bodies in *combustion*, combustible bodies evolve the light and heat which they generate by chemical agency.

In all common cases of combustion the heat which is generated by it is accompanied by flame, but not necessarily so. Some idea of the difference may be formed by observing the circumstances under which bituminous coal and anthracite burn; the former burns with flame, and the latter with scarcely any.

COMBUSTION, SPONTANEOUS HUMAN. This term is applied to a singular phenomenon which occasionally occurs in the human system. Many of the older medical writers spoke of a mysterious burning of the human body, which, as it seldom occurred, was frequently doubted. Cases however of a consuming or decomposition of various parts of the body during life, with the evolution of light, have been constantly put on record, and although often misrepresented by superstition and ignorance, the evidence of such a combustion of the human body is admitted as perfectly satisfactory by the best writers on medical jurisprudence of the present day.

One of the earliest well-authenticated cases put on record occurs in the Transactions of the Copenhagen Society. A woman of the lower classes, who had for three years used spirituous liquors to excess, and took little of any kind of food, sat down one evening on a chair to sleep, and was consumed during the night, so that next morning no part of her was found entire except the skull and the joints of her fingers; all the rest of the body was reduced to ashes. In the forty-third volume of the 'Philosophical Transactions' there is a case related which occurred in 1744. A woman of the name of Grace Pett, who was in the habit of getting up in the night to smoke by the kitchen fire, was found one morning by her daughter dead. The body was extended on the hearth with the legs on the deal floor, and it had the appearance of a log of wood consumed by a fire without apparent flame. The girl immediately ran and procured water to pour over the burning body, which produced a suffocating smoke and brought in the neighbours; but the woman was quite dead. The trunk was incinerated, and resembled a heap of coals covered with white ashes. The head, the arms, the legs, and the thighs had also participated in the burning. It is stated that she had that day drunk a large quantity of spirituous liquors. There was no fire in the grate, and the candle had burnt entirely out in the socket of the candlestick which was close to her. There were also found near the body the clothes of a child and a paper screen which had sustained no injury from the fire. Her dress consisted of a cotton gown.

Since the period at which this case was recorded many others have occurred to competent observers and been accurately described. Beck in his Medical Jurisprudence gives references to twenty-eight cases, which are probably not more than half that have been related in various places. Dr. Apjohn, in the article 'Spontaneous Human Combustion,' in the 'Cyclopædia of Practical Medicine,' relates four cases which have occurred in Ireland within the present century. All were females and addicted to ardent spirits.

The following conclusions may be deduced from the various cases which have been related:—

1. The subjects were nearly all females. Of seventeen cases collected by Kopps, sixteen were females. Eight cases mentioned by Lair are all of the same sex. They were far advanced in life.
2. Most of the individuals had for a long time been addicted to the use of ardent spirits, and they were either very fat or very lean.
3. The combustion occurred accidentally and often from a slight cause, such as a candle, a coal, or even a spark.
4. The combustion proceeded with great rapidity, usually

consuming the entire trunk, while the extremities, as the feet and hands, were occasionally left uninjured.

5. Water, instead of extinguishing the flames which proceeded from the parts on fire, sometimes gave them more activity.

6. The fire injured very slightly or not at all the combustible objects which were in contact with the human body at the moment when it was burning.

7. The combustion of these bodies left as a residuum fat fœtid ashes, with an unctuous, stinking, and very penetrating soot.

8. The combustions have occurred at all seasons, and in northern as well as southern countries.

These facts being admitted, the question arises as to what is the nature of the process by which this decomposition of the body has been effected? That it is not an ordinary combustion of the body from external agents is very evident. Dr. Beck says 'that large quantities of fuel are needed to convert the body to ashes. It is necessarily slow in its progress, and the heat required, being high, would extend itself to surrounding substances. The combustion also in ordinary cases would often be incomplete, and particularly so as to the bones. Again, if the body be not wholly unconsumed, there will be blisters, scars, &c. on various parts.' It must therefore arise from some change in the chemical composition of the body, which favours its combustion at a lower temperature than usually occurs at the surface of the earth. All union of carbon, hydrogen, sulphur, phosphorus, &c. with oxygen, is combustion. This is constantly going on in the lungs of all animals, and generating animal heat. The heat evolved in this process is not sufficient to produce light, but if the temperature was exalted only a few degrees above that of the human body, it would be possible for light to be emitted, and this actually takes place in the burning of highly inflammable compounds, such as æther. There can, we think, be little doubt of the possibility of such a chemical composition of the blood and solids of the body taking place, under the influence of a stimulating compound containing the combustible elements carbon and hydrogen, which would under certain circumstances produce a slow combustion by contact with the oxygen of the atmosphere. Other theories have been advanced, but are not so free from objection as the one we have advanced above. Pierre Amie Lair and others attribute it to the impregnation of the tissues of the body with alcohol, but Fontenelle immersed pieces of meat for a length of time in alcohol, and could not consume them by setting fire to them. Maffei, Le Cat, and Kopp suppose it to be an electrical phenomenon. Marc, in the article Spontaneous Combustion in the 'Dictionnaire des Sciences Naturelles,' supposes that it may arise from inflammable gases, such as carburetted and phosphuretted hydrogen, generated in the human body; and the probability of this mode of production Dr. Apjohn is inclined to adopt.

The consideration of this subject may be the object of medico-legal inquiry; and although within a recent period it has not been brought before the courts of law, the following case indicates its relations in medical jurisprudence. It is related by Le Cat. The wife of the Sieur Millet of Rheims was in the habit of indulging in the use of ardent spirits, and the economy of her household was managed by a handsome female servant. On the 20th of February, 1725, she was found consumed at a distance of a foot and a half from the hearth in her kitchen. A part of the head only, with a portion of the lower extremities and a few of the vertebræ, had escaped combustion. A foot and a half of the flooring under the body had been consumed; but a kneading-trough and a tub which stood close by sustained no injury. Millet, being interrogated by the judges, stated that his wife had retired to rest with him, but had left him during the night; supposing she was warming herself by the kitchen fire, he fell asleep, but was awakened about two in the morning by a strong odour; and having repaired to the kitchen, he found his wife in the state described. The judges, from the evidence, supposed he had conspired with the servant to kill his wife, and condemned him to death; but, having appealed to a higher court, the circumstances were again examined, and the judgment reversed, the case having been pronounced one of spontaneous combustion.

(Foderé, *Traité de Médecine Légale*; Beck, *Medical Jurisprudence*; Apjohn, *Cyclopædia of Practical Medicine*; Marc, *Dictionnaire des Sciences Médicales*.)

COMMIA, a genus of plants belonging to the natural order Euphorbiaceæ. It has diœcious flowers. The staminiferous flowers are formed of bracts united into an amentum,
the stamens are numerous and united into a sin
The pistilliferous flowers are racemose, the calyx i
the styles 3, the capsule 3-lobed.

C. cochinchinensis is a small tree with a resinou
has alternate, entire, smooth leaves. The male
amentaceous, the catkins consisting of imbricated
scales, axillary and short; the female racemose, te
small. This tree yields a gum which possesses
purgative properties. It is recommended in cases
but has not been introduced into European practi
native of Cochin China.

(Lindley, *Flora Medica.*)

COMMISSARY, an officer who is delegated
to act in a particular part of the diocese, to ex
diction similar in kind to that exercised by the c
the diocese in the consistory court of the dioces
missary has, generally speaking, the authority
principal and vicar-general within his limits.
lies from his decisions to the metropolitan. In so
there is a commissary court for each archdeac
commissarial courts were established for the co
the people in parts of the diocese remote from th
court. A commissary must be learned in the civi
siastical law, a master of arts or bachelor of law
the age of twenty-six, and he must subscribe the
articles (Canon 127).

In Scotland the same classes of questions whi
parts of Europe were arrogated to the ecclesiastical
came under the authority of the bishops' court
episcopal polity continued, and subsequently
special judges, who were called commissaries.
commissaries of Edinburgh constituted the Supre
sary Court, which had jurisdiction in questions
and of declarations of the existence or non-existe
riage. The district commissaries had the a
authority of confirming executors to persons
function resembling the granting of letters of a
in England. By 4 Geo. IV. c. 97, the functions
vincial commissaries were vested in the sheriffs of
tive counties, who, before the passing of th
usually appointed the commissaries of their distri
Geo. IV., 1 Wm. IV. c. 69, the jurisdiction
missaries of Edinburgh, as above, was vested in
Session.

COMMISSION. [Agent, P. C.; Brok
Factor, P. C.]

COMMISSIONERS, LORDS. [Assent, Ro
Admiralty, P. C.]

COMMISSIONERS OF BANKRUPTS.
P. C.]

COMMISSIONERS OF SEWERS. [Sew

COMMITTEE OF A LUNATIC. [Lun

COMMON RECOVERY. [Recovery, P.

COMOCLA'DIA (from κόμη, hair, and κλάδος
a genus of plants belonging to the natural order A
It has hermaphrodite or monœcious flowers; a
permanent calyx, 3-4 long petals; 3-4 short
single ovary with no style, and a single stigm
1-celled, 1-seeded drupe; the seed somewhat pen
a curved funiculus originating at the base of the
albumen.

C. dentata, Tooth-leaved Maiden Plum.
shining leaves, green above, with a round rac
long, 6-10 leaflets on each side, with an odd
acuminate, spiny-toothed, veiny, and somewhat d
back. This plant is a tree reaching a height of
feet. It is a native of the woods of Cuba and S
where it is called Guao. It has an erect not mu
stem. A milky juice exudes from it, which is gl
becomes black by exposure to the air. It stain
the skin black, which cannot be washed out of
and only comes off from the latter by the exfoli
cuticle. It is believed, by the natives of Cuba, th
for persons to sleep under this tree, especially if
or of a full habit of body. It is, undoubtedly,
tree, although nothing is recorded of its mode of a
system.

C. integrifolia has stalked leaflets, lanceolate,
smooth. It is a tree twenty feet high, with sm
deep red flowers. The berries are black and su
may be eaten with impunity, but are not pleasant
The wood is hard, of a fine grain, and reddish c
tree gives out a watery juice, which is slightly gl

ack on exposure to the air. Like the juice from the
tains linen and the skin indelibly. It is a native of

, *Gardener's Dictionary*; Lindley, *Flora Medica.*)

PLEMENTARY COLOURS. [COLOURS, COM-
TARY, P. C. S.]

POS, or NON COMPOS MENTIS. [INSANITY,

POUNDING A FELONY. [FELONY, P. C.]

PRESSIBILITY OF WATER. Like almost
her substance, water expands in volume by an in-
f temperature, and contracts by a decrease; but it
peculiar property, that at a temperature expressed by
) degrees of Fahrenheit's thermometer it attains a
n of density. The quantity of water which, at 60
would occupy one cubic foot, at 40 degrees occupies
907 cubic foot; while at the temperatures both of
35° (its fluidity at the latter temperature being pre-
y the avoidance of all agitation) the volume is
ubic foot (Gilpin, Phil. Trans., 1792): the increase
e at temperatures below 40° is ascribed to some ten-
the water to crystallize while it is still fluid.

ariations produced in the volume by variations of
ure, as well as the fact that water is a conductor of
d consequently that it possesses some elasticity, are
sidered as arguments that water may be capable of
npressed by mechanical means; but the quantities of
ion which have been obtained by experiments made
urpose are so small as to render it very difficult to
e its precise value.

l some members of the Accademia del Cimento at
made experiments of different kinds in order to
whether or not water was compressible; and one of
sisted in filling a hollow globe of silver with water
int of freezing: an effort was then made, by blows
mmer, to diminish the volume of the globe by alter-
n, when it was found that the water escaped through
of the metal. The like experiment was made by
broeck in 1731, with a globe of gold, which was
with a like result; and, till the year 1762, it was
d that water was incapable of being reduced in
y pressure. In that year Mr. Canton introduced
a certain temperature into a glass tube, and having,
lication of heat, made the water fill the tube so as to
air, he sealed the tube hermetically: then, having
he temperature to its former value, he broke off the
tremity of the tube in order that the atmosphere
ess on the top of the column of liquid, when the
the latter was found to be thereby diminished. The
riment was tried with alcohol, oil, and mercury;
fluids were found to suffer different diminutions of
y the pressure.

been imagined that the apparent diminution of the
f water was only the result of an expansion of the
nsequence of the elasticity of the atmosphere, when
was allowed to enter it; but, if such expansion
produced the effect, it would have been the same,
d have caused equal depressions, in the columns of
kinds of fluid, whereas the depression of the water
t fifteen times as great as that of the mercury:
ittle doubt therefore that the observed diminutions of
re results of the compressions of the fluids by the
the atmosphere.

xperiments of Canton show that, under a weight
hat of an atmospherical column in its ordinary state
es of mercury), the compressions of the four follow-
, in millionth parts of their volumes, and at a tem-
equal to 50°, are—

Alcohol . .	66
Rain-water .	46
Sea-water . .	40
Mercury . .	3

PRESSION OF THE BRAIN. [HEAD, INJU-
P. C.]

PTONIA, a genus of plants belonging to the natu-
Myricaceæ, named after Henry Compton, Bishop of
by whom the fine collection of plants attached to the
palace at Fulham was formed. The male flowers
indrical loosely imbricated catkins, with deciduous
d bracts; 2 sepals; 6 stamens, adhering in pairs; the
owers have ovate densely imbricated catkins, with
d bracts; 6 sepals, larger than the bracts; 2 capil-
s, and a 1-seeded nut. There is only one species, the *C. asplenifolia*, Sweet Fern. It is a small bush, three or four feet in height, yielding a powerful aromatic fragrance when rubbed between the fingers. It has long linear pinnatifid leaves, brown and rather downy on the under side, shining on the upper. It is a native of the woods and mountains of the United States, where it is a favourite domestic remedy in the cure of diarrhœa. It possesses tonic and astringent properties. It is a handsome shrub, and will thrive in a peat soil or sandy loam, and may be propagated by layers or suckers. It was called *Liquidambar asplenifolium*, by Linnæus, but differs very much from that genus in its characters and properties.

(Lindley, *Flora Medica*; Loudon, *Encyclopædia of Plants.*)

COMPUTATION. We need not tell those who are acquainted with the existing treatises on arithmetic, that in no one instance do they pretend to give any mode of forming good habits of computation. The beginner, after receiving instructions as to what is to be done in the several great rules of arithmetic, is allowed to manage the details as he can.

The mere mechanical art of computation, apart from arithmetical reasoning or application to subjects of interest, is no very lofty exercise of the mind. A wonderful degree of proficiency in it can be attained by many who find connected reasoning almost an impossibility: and on the other hand, some of the first among mathematical discoverers have hardly arrived at more than the expertness of an ordinary schoolboy. It is one of those arts among many which are accessible to all who begin with a determination to conquer difficulties, and a power of arriving at methodical habits: no person who, after beginning in the right way, is obliged to confess a total failure, has any ground to suppose that he could master a common manual art: he may be a genius, but nothing could make him a weaver. That we may not frighten any one of the thousands who are miserable computers after going through years of school discipline, and whose minds are too well made to allow them to flatter themselves that they were above it, it is but fair to say that very few are allowed to begin in the right way. Every merely mechanical business must be learned by a sufficient repetition of the most purely elementary steps. A discipline of the mind may be taken up at the wrong place, and still be a discipline, though not so perfect as it might have been. But in what is merely art, nothing can compensate for the want of habit of operation duly learned at the proper time. Now computation is only an art: its elements are a small number of acts of memory: its details consist in a still smaller number of operations, each of which, by itself, is of the utmost simplicity.

Many readers will suppose us, in speaking of the elementary rules of arithmetic, to mean addition, subtraction, multiplication, and division, as given in the books: but we should as soon think of saying that the elementary operations of a journeyman tailor's business are the making of coats, waistcoats, and trowsers. The rules just named are the perfection of computation, not its commencement: he who can do them all with ease and accuracy is a calculator. The fundamental operations of which we speak are to those elaborate processes just what threading a needle and drawing a stitch are to the making of a coat. We can carry the comparison still further: and its justice is not accidental, but the necessary consequence of the resemblance of all mechanical operations. We do not say that a workman who is capable of joining two pieces of cloth together with strength and neatness is a finished tailor: he cannot therefore choose cloth, cut out work, imitate fashions; but he can follow directions, and he is the man who actually makes the coat. Nor do we mean that the person who can merely perform the four rules is a complete arithmetician: he cannot know how to apply those rules, he has not learned how to think of their uses. But, under directions, he can really manage the last and executive process of any mathematical inquiry. Until he is something better, he is but a tool in the hands of others, but no one thinks the less of tools because they cannot work of themselves.

Is this then, we shall be asked, all that you propose, namely, to describe addition, subtraction, multiplication, and division? We answer, yes, and on these simple grounds, that nothing more is wanted, and that in what we have to say upon them, we shall touch the reason why so many persons are incapable of and disgusted with arithmetical process. There are but few who find much difficulty in comprehending what is to be done in a question of arithmetic: but there are many who find that, however clearly they may see the way, there is a heavy and broken ascent between them and the answer. The figures will not come right, there is nothing but mistake after mistake: and though everything else is gained, the result is not. Few of those who are thus perplexed are aware that nothing is wanting but attention to the elementary processes with a better method than a beginner invents for himself: every one knows that books and teachers give no method at all.

The following system of exercises constitutes the whole of what is necessary. The degree of attention with which each is to be practised must depend upon the circumstances of the learner's case. Each one contains a difficulty which most persons will suppose they could avoid, some in one manner, some in another. Their several suppositions are true: and it is just as true that the trouble and risk with which an infant learns to walk upon its feet could be avoided: some could continue to crawl, others could contrive to walk on their knees: all would get on in a certain manner. Any person who is determined to succeed, and who has reason to know that his method has not answered as yet, should try our plan with the faith of a learner. But we can promise him no success unless he will make up his mind, from the outset, entirely and at once to abandon every habit which we condemn, and to adopt every mode which we prescribe: and this, though it should seem to him that what he has to take up is more difficult than what he is to leave off. He may take any time, and must not be discouraged by finding that the new operations are at first longer than the old ones. He must continually attempt more and more rapidity, remembering that quickness of operation will never come of itself by practising with deliberate caution. Slow and sure is better than quick and wrong, no doubt, if one or the other must be the end of it; but *quick and sure* must be the motto of an arithmetician. All very correct computers that we have seen have been rather rapid workers: we believe the reason to be that those who cannot acquire rapidity give it up in disgust.

1. Presuming that the learner can count one, two, three, &c., as fast as he can speak the words, he must then try if he can do the same backwards, as fifty, forty-nine, forty-eight, forty-seven, &c. He must then practise counting forward—by two at a time, as in 2, 4, 6, &c., 1, 3, 5, &c.—by three at a time, as in 1, 4, 7, &c., 2, 5, 8, &c., 3, 6, 9, &c.—by four at a time, as in 1, 5, 9, &c., 2, 6, 10, &c.—and so on up to 11 or 12 at a time. The same should be done backwards, as in the following by sevens, 90, 83, 76, 69, &c. In doing this he must not use any description, either vocal or mental: it must not be 22 and 6 are 28, 28 and 6 are 34, &c.; but 22, 28, 34, &c. These various processes should be carried to or from 100 at least.

2. Proceed to form with rapidity the number which must be added to a given number to make up the next number which ends with a given digit. Thus, one of the questions asked, at its fullest length, is 'Given 38 and 4, how much must be added to 38 to give the next number that ends with 4?' But all that must be repeated, orally or mentally, is '38 and six are forty-*four*.' Write down a row of numbers, as in

7 2 9 6 3 2 8 4 1

and practise thus:—72 and 7 are 79, 29 and 7 are 36, 96 and 7 are 103, 63 and 9 are 72, &c.; taking 72, 29, 96, &c. for the successive lesser numbers, and 9, 6, 3, &c. for the successive unit figures of the greater numbers.

3. Endeavour occasionally, in the exercise immediately preceding, and in those which follow, to fix the thoughts particularly upon the *tens* of the result. It will generally happen that the units are immediately to be written down and discarded, while the tens are to be retained in memory. Practise repeating a number, so as while repeating it to write down the units and think of the tens: thus, in 76, at the moment of writing down 6, think of 7.

4. Learn the multiplication table up to 12 times 12, but not with the usual practice of wording all the results, as in '7 times 8 make 56,' '4 times 5 are 20,' &c. The table must be so learnt that the two factors suggest the product instantaneously. Thus, 8 and 9 must give 72 the instant they come together in the mind; and so on. Take a row of numbers as before, and looking at the successive pairs, repeat the products. Thus, 2 9 8 7 4 3 5, &c. is to suggest 18, 72, 56, 28, 12, 15, &c. as fast as the words can be spoken. Those who have been accustomed to learn the multiplication table from the half of it, always putting either the greater factor first, or else the lesser, must now accustom themselves to the whole: 5 and 9, or 9 and 5, must suggest 45 with equal ease.

5. *Augment the last* exercise as follows:—Having three digits, learn to pass in thought immediately to the p
the first two augmented by the third; thus, 7, 9, an
lead to 7 times 9 increased by 8, or 71. Take
figures, as before, say 2497163, &c. which must be
means of suggesting immediately 17, 43, 64, 13, 9,
usual repetition, 'twice 4 are 8 and 9 are 17,' &c.
be tolerated for one moment.

6. Acquire the power of combining the fifth an
exercises as follows:—Having four digits, learn t
third to the product of the first and second, and to pass
next number which has the fourth in its unit's place
with 7, 8, 5, and 0, think of 61 (7 times 8 and 5)
last exercise, and as in the second, get '61 and 9
Repeat only as much as is in the last phrase, dealing
first three numbers by the habit acquired in the last
Thus, with the row of numbers 19728663, &c. s
rapidly suggested—16 and 6 are 22, 65 and 3 are 6
4 are 26, 22 and 4 are 26, 54 and 9 are 63, &c.

7. Having four numbers, deal with the first three
fifth exercise, and then repeating the result, add th
Thus, from 2, 7, 5, 8, get 19 and 8 are 27. Thus,
of figures 7984361, &c. must give—71 and 4 are 75,
are 79, 35 and 6 are 41, 18 and 1 are 19.

8. Having a digit and a number of two places,
arrive speedily and with few words at the number
which the second contains the first (when not more
and at the remainder. Thus, '7 in 53, 7 times and
29, 3 times and 5,' &c.

A person who really desires to become a good
must arrive at the power of performing these exerci
quickly, and accurately. It is possible to dispense w
and it is possible to dispense with rules and numerals
and to use pebbles. But we are very confident t
these exercises are once made very rapid and safe,
puter has gone through nine parts out of ten of his
he can walk, and will soon learn to find his way.
mon error lies in imagining that learning to find t
learning to walk.

We now take the four rules, insisting on the deta
mode of performing each of them, and presuming
process to be known.

Numeration.—Learn to distinguish tens, hundr
not by the places in which their digits come, but by
bers of places which come after those places. Inste
necting thousands in the mind with the *fourth* place,
them with *three places cut off*. Thus 176493 has 1
dreds, 176 thousands, &c.

Addition.—Add as in exercise 1; thus, if the fig
to be 7 2 3 4, &c., it should not be 7 and 2 are 9
12 and 4 are 16, &c., but 7, 9, 12, 16, &c. Dwell
tens to be carried, in writing down the units. In th
ing question, every word that should be repeated,
mentally, is written down, and each figure that is to
down is marked with an accent; each ten that is to
on for a moment is in italics:—

27649	8, 17, 22, 30, 36, *forty*-five′
9276	10, 19, 20, 27, *thirty*-one′
308	11, 18, 24, 27, 29, *thirty*-five′
44615	3, 5, 9, 18, *twenty*-five′
2799	3, 7, nine′.
10868	
95515	

Let the method of verification be simply taking th
in the opposite order, or downwards, as 9, 15, 2
forty-five′, &c.

Subtraction.—Let the several subtractions be
mental recovery of additions as in exercise 2: not '7
leaves 9,' but '7 and 9,' not repeating 16, which is unn
inasmuch as when 9 is found, 16 is done with, and
riage of one is all that is to be remembered. The
detail has every word of the process:—

274631807	8 and 9′; 5 and 5′; 10 and 8′; 9
95318948	2 and 1′; 3 and 3′; 5 and 9′; 10
	1 and 1′.
179312859	

According to even recent books the computer sh
'8 from 7 I cannot, but 8 from 17 and there rema
down 9 and carry one,' &c. It would be shorter th
say, '8 from the next higher number that ends with
9.' Our plan is the abbreviation of '8 and 9 make
next number that ends with 7' repeating only the f
words.

cation.—Apply the exercises 4 and 5 to the usual
Iere, as before, the detail given has every word
be repeated. The figures to be written down are
ll others are carried.

54′, 86′, 26′, 6′5′; 80′, 48′, 14′, 3′6′; 48′, 76′,
23′, 5′8′; 4′; 6′; 8, 16, 22′; 8, 12, 17′; 4, 10,
16′; 9, 12′; 6′.

l process of *casting out the nines*, as it is called,
an absolute verification, is a useful one. With-
; upon its demonstration, we describe it.
ut the nines, means adding together the digits of
nd throwing out 9 as fast as it arises. Thus in
e have—2 and 6 are 8 and 6 are 14, throw out 9
ins; take in the next figure 4, giving 9, throw
remains; then 7 and 8 are 15, throw out 9 and 6
ass over the 9 and take in 5 which gives 11, on
mains. All that is necessary to be repeated is,
9, 7, 15, 6, 11, 2. Cast the nines out of both
tiply the results, and cast out nines; the answer
the same figure as the reputed product gives
nes are cast out. Thus 7296 and 859 give 6 and 4,
of which is 24, giving 6: and the reputed product
o gives 6. This is a high presumption that the
ect: the error, if any, lies in this, that the figures
which are too great are exactly compensated by
are too small. Now it is very unlikely that this
nsation of errors should exist; and in this un-
onsists the strong presumption of verification
le of casting out the nines affords.
observed that this rule applies to all operations,
ith the result of casting out the nines the same
with the numbers from which the nines were cast
wer, with its nines cast out, should give the same
ises from casting out the nines of the reputed
us in the previous example of addition, the nines
the several numbers to be added give 1, 6, 2, 2,
o of which, with nines cast out, is 7, the same as
puted answer 95515. In subtraction, it may be
take in a nine before subtracting.
–This rule is considerably shortened, and (in our
ugh we think many would differ from us) in-
afety, by performing each subtraction without
the multiplication. As a preliminary, suppose
o subtract 7 times 29398 from 410843. Begin-
×8 instead of putting it down as 56, look at 3
m 56 to 63, writing down the 7 and carrying the
sed. Take these 6 tens and 7 times 9, giving 69,
em up to 74, putting down the 5, and carrying 7.
d be repeated is as follows, dwelling on the tens

```
3      | 56 and 7′ make 63 ; 69 and 5′ make 74 ;
8×7    |   28 and 0′ make 28 ; 65 and 5′ make 70 ;
–      |   21 and 0′ make 21 ; 2 and 2′ make 4.
7      |
```

293614829 is to be divided by 47698. Instead
plan, write the divisor on the left, or the quotient
: at any rate, the divisor and quotient should be
ther.

```
ivisor 47698)3293614829
otient 69051    431734
                  245282
                    67929
                    20231 remainder.
```

is as follows:—The first quotient figure being 6,
mes 47698 from 329361, thus: 48 and 3′ are 51,
66, 42 and 1′ are 43, 46 and 3′ are 49, 28 and
The 4 being brought down, and 9 ascertained to
quotient figure, we have 72 and 2′ are 74, 88 and
and 4′ are 67, 69 and 2′ are 71, 43 and 0 (un-
re 43. Then 8 and 2 are brought down, 0 and
quotient figures, and 40 and 2′ are 42, 49 and 9′
nd 7′ are 42, 39 and 6′ are 45, 24 and 0 are 24.
otient figure is 1, and 8 and 1 are 9, 9 and 3′ are
′ are 9, 7 and 0′ are 7, 4 and 2′ are 6.
ut the nines, the products obtained from the
uotient, increased by the result of the remainder,
casting out nines, to agree with the dividend.
Here the divisor gives 7, the quotient 3, and the remainder 8: 7 times 3 and 8 is 29, giving 2; the dividend also gives 2.

We have put down every step of the work in all the rules. The very basis of this method is the acquisition of such expertness in the previous exercises as will enable the computer to dispense with a large quantity of the ordinary halting-places. We need not enter upon the rules for the extraction of the square and cube root [SQUARE, P. C.], or of the solution of equations [INVOLUTION AND EVOLUTION, P. C.], at length; but we shall annex an example of each, leaving the reader to apply the seventh exercise in its proper place. In the contracted part of Horner's method, we add to the method of the last article cited, a provision for making the first figure on the right of the vertical line of contraction as correct as the process will allow it to be. This last process (Horner's method) is the best exercise of computation. It involves all rules in a form of considerable detail and dispersion.

First, we put down the process for the extraction of the square root of 157.

```
             • •
             157(12·529964086141667788495 87
22           57
245          1300
2502           7500
25049          249600
250589           2415900
2505986            16059900
25059924             102398400
2505992808             21587040000
25059928166              153909753600
250599281721               355018460400
2505992817224              10441917867900
2505992817228                417946599004
 •••••••••••••               167347317281
                              16987748248
                               1951791345
                                197596373
                                 22176876
                                  2128934
                                   124140
                                    23900
                                     1347
                                       94
                                       19
                                        1
```

Now let it be required to find the positive root of $x^3+x^2-12x-12=0$.

```
1   1          —12              12(3·4641016151377545871
      4          0              12000
      7          2100            1936000
    100          2516              126664000
    104          294800              3142656000
    108          301556                 49958279000000
    1120         30834800               19025101177699
    1126         30880336                  468183547708
    1132         3092588800                158901517715
    11380        3092702721                  4260501864
    11384        30928166430000              1167681541
    11388        30928177822301               239835444
    113920       30928189214603                22338022
    113921       30928196049985                 1688280
    113922       30928202885367                  141870
    11392300     3092820299929                    18157
    11392301     3092820311321                     2693
    11392302     309282031702                       219
    11392303     309282032272                         3
                   ••••••••••                         0
```

In both these examples the result is carried to about three times as many figures as are usually wanted. But this is what should be done in computing for exercise. No one does his very highest with ease or with certainty; and a person who can safely and rapidly knock off the seven or eight figures which are generally requisite must be one to whom a much larger amount of correctness is, or has been, familiar.

It is necessary to insist particularly upon acquiring the habit of rapid computation by attempts at rapidity. Taking any exercises which verify one another, as a multiplication and a division, or a raising of a square and extraction of the square root, the learner who has acquired a little familiarity with the rules should try them at the top of his speed. If the verification be attained; if the division, for instance, reproduce the multiplier for a quotient, without remainder, it is thousands to one that the whole process is correct. But if there should be a failure, as may, and almost certainly will at first, happen several times running, there is no occasion to examine closely into the reason of the failure. The whole question should be thrown aside, and another should be taken. In this course it will soon appear that the attempts become more and more nearly correct, until at last failure is the exception, and not the rule. There must be no fear of error, whether there be cause for it or not. The young calculator should proceed as boldly as if he were infallible; for he may depend upon it, that it is not inaccuracy which is to be avoided by precaution, but accuracy which is to be obtained by habit.

With regard to minor points, every one must decide for himself whether actual vocal repetition of the words and numerals necessary to the process does or does not tend to accurate working. Some persons cannot compute without repeating to themselves; but it is worth while to give silence a fair trial. It would also be of assistance to some persons to invent a habit of signifying the multiplier, which is in actual use, by some arbitrary position of the left hand. Thus, 1, 2, 3, and 4 might be signified by placing the corresponding number of fingers of the left hand on the paper, 5 by placing the thumb only, and 6, 7, 8, and 9 by the thumb, with a corresponding number of fingers.

In all those parts of computation which relate peculiarly to fractions, common or decimal, we know of no guide but reason. The ultimate process, the actual step for the time being, must be either addition, subtraction, multiplication, or division; and accuracy may be acquired mechanically. However desirable it may be that the learner should demonstrate these processes, his power of performing them does not depend upon his being able to do so. It is otherwise with regard to the new and distinct processes introduced in questions which require fractions; and which are in fact, not themselves processes, but directions for selection of processes.

The general run of commercial calculations hardly needs any distinct preliminary exercise. There is one great improvement of which ordinary methods are susceptible, namely, the expression of the parts of a pound decimally, instead of by shillings, pence, and farthings. Until a decimal coinage is obtained [STANDARD, P. C.], any person with a moderate knowledge of decimal fractions may procure for himself most of its advantages, by the rules which are partially given in INTEREST, P. C., and which we here make complete. The demonstration will be easy enough to those who consider the fraction which one farthing is of a pound, ·0010416666. . . ., or ·00104⅙.

To write down any fraction of a pound decimally, proceed as follows:—

Fill up the *first place* of decimals with 1 for every pair of shillings; and the *second and third places* with 50 for the odd shilling, if any, and 1 for every farthing in the pence and farthings, with an additional 1 if these amount to sixpence. Thus, as far as three places of decimals, 8*s.* is ·4*l.*, and 9*s.* is ·450*l.*; 9*s.* 3*d.* is ·462*l.*, 9*s.* 5½*d.* is ·472*l.*, 9*s.* 6*d.* is ·475*l.*, 9*s.* 8¾*d.* is ·486*l.*

Fill up the *fourth and fifth places* with 4 for every farthing above the last sixpence, and an additional 1 for every three halfpence. Thus, as far as five places of decimals, 9*s.* 3*d.* is ·46250*l.*, 9*s.* 5½*d.* is ·47291*l.*, 9*s.* 8¾*d.* is ·48645*l.*, 9*s.* 10¼*d.* is ·49270*l.*

Fill up *all the remaining places* with the decimal fraction derived from the number of farthings above the last three halfpence for a numerator, and 6 for a denominator. Thus, 9*s.* 3*d.* is completely expressed in ·4625*l.*, 9*s.* 5½*d.* is ·472916666. . . .*l.*, 9*s.* 8¾*d.* is ·4864583333. . . .*l.*, 9*s.* 10¼*d.* is ·4927083333. . . .*l.*, 10*s.* 0¾*d.* is ·503125*l.*, 3*s.* 3½*d.* is ·164583333. . . .*l.*

For the most part three places are sufficient; and it is rarely that more than five are wanted. The inverse rule, namely, that for reading off a fraction of a pound into shillings, pence, and farthings, is done from the first three places, within a farthing, by allowing a pair of shillings for each unit in the first place, another shilling for 50 (if there be so much) in the second and third places, and a farthing for each 1 that is left in the second and third places, deducting 1 if 25 or more be left. Thus ·12345*l.* is 2*s.* 5¾*d.*, ·29933*l.* is 5*s.* 12*d.** or 6*s.*, ·267*l.* is 5*s.* 4¼*d.*

These rules look repulsive at first. None but those who have practised them until the transformation is easily made, can have any idea of the amount of labour which they save. They are in fact as good as a decimal coinage to those who have mastered them. Those who doubt of it may try the following question in the usual way, and compare it with the decimal mode.

When the government, for ease of calculation,
seven pence in the pound instead of 3 per cent., as a
tax, how much tax, to a farthing, did they give up
millions of income? On one pound 3 per cent. i
seven pence is ·0291666666. . . ., which falls sho
former by ·0008333333. . . . : and this, taken 100
times, is 83333·333*l.*, or 83333*l.* 6*s.* 8*d.*

Some development of the reasons for the plan wh
the main part of this article will be found in the 'C
to the Almanac' for 1844.

CONCA, SEBASTIANO (Cavaliere), a c
Italian oil and fresco painter of the eighteenth cent
born at Gaeta, in the kingdom of Naples, in 1676.
for sixteen years the pupil of Solimena at Naples, but
to Rome in 1706 by the great reputation of th
masters, he and his brother Giovanni determined
there, being convinced of the superiority of the
school. Conca, with an unparalleled resolution,
the brush in his fortieth year, and for five years exe
self assiduously and exclusively with the portcrayon,
the best antient and modern works in Rome, with
improving his style of design. The reward howeve
worth the price, for his works, though improved,
mannered; habit had too strong a possession of
returned at length to painting, by the advice of Le
sculptor.

Conca was one of the imitators of Pietro da Cor
possessed to a great degree the facilities of that m
was ready, rapid, and superficial. His works are nu
Rome and in the Roman States: there is one at Sie
is considered his masterpiece, the Probatica, or th
Pool of Siloam, in the hospital of Santa Maria de
Several of Conca's works have been engraved by
others, and he etched a few plates himself. He
Naples in 1764. There is an eulogium upon him by
in his 'Memorie delle Belle Arti' Giovanni Co
chiefly as his brother's assistant.

(Lanzi, *Storia Pittorica*, &c.)

CONCEALMENT OF BIRTH. [INFANTICI

CONCERTI'NA, a musical instrument recently
by Professor Wheatstone, the principle of which is
under the word ACCORDION, P. C. S. The Conc
its simple form, claims priority of the Accordion in
date, though the former, in its highly improved sta
now generally in use, was more lately introduced.

This instrument is composed of a bellows, with tw
gonal faces or ends, and on these are placed th
stops, or studs, by the action of which air is admitte
laminæ (or tongues, or steel bars) producing the
and hereon are also fixed the thumb-straps and fin
The finger-stops are in four rows, the two middle c
fined to the notes of the natural scale, the two exter
to the flats and sharps. Each sharp and flat is place
side of its corresponding natural note, and the instru
in addition to a complete chromatic scale, two other
each octave, whereby the chords in different keys are
more perfect than on the organ or piano-forte, and
also the fingering of the various scales is rendered
easy.

The Concertina, when the bellows is extended,
inches in length, and the sides are about six inches
compass is three octaves and three notes, commenci
the fourth space in the base, and thence ascending
instruments, however, are made with a higher, some
scale. That which we here describe is called the
Action Concertina, because two springs, or ton
given to each note, in order that the same sound ma
duced, whether the bellows be pressed in or drawn
Single-Action Concertina has but one spring, or to
each note, yielding a sound only when the bellows
inwards; that is, pressed. But it is provided with a
valve, in order that the bellows may collapse instant
which closes while the latter is pressed, and opens
air when it is expanded. A still further improveme
instrument is said to be ready to be produced, which
a complete treble and base.

There are also tenor and base Concertinas: the
the first from c, the second space is the base, to c th
additional line above the treble: of the last, from th
additional line below the base, to the third spac
treble.

CONCUSSION OF BRAIN. [HEAD, INJ
THE, P. C.]

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* When 49 is left in the second and third places, this mode gives the same as when 50 is left. The direct rule gives the exact truth or a little less, the inverse rule gives the exact truth or a little more; about one farthing more in the case here before us.

CONDENSER, a vessel employed to facilitate the lique- tion of aqueous or spirituous vapours, by exposing them to the sing effect of a current of water, which may be either injected mediately upon or among the vapour, or, where it is re- red to keep the condensing water and the product of con- sation distinct, separated from the vapour by a thin parti- of metal. In the latter case copper is the metal most erally employed, on account of the rapidity with which it ducts heat, and the facility with which it may be fashioned thin sheets adapted for the purpose.

he condensers employed for suddenly diminishing the me of steam after it has impelled the piston of a con- sing steam-engine are noticed under Steam-Engine, P. C., 74, &c., and Steam-Vessel, P. C., pp. 507, 508. The denser forms a very important part of any steam-engine ch works by condensation as well as pressure, but is cially important in a marine steam-engine. 'It is here,' rves Mr. Scott Russell, in the admirable treatise on Steam igation contributed by him to the new edition of the cyclopædia Britannica,' 'that the whole process carried n the boiler in so great bulk, and at so much expense, is ntly reversed, and all its laborious effects at once, as it , annihilated.' The instantaneousness of condensation s, in this case, its most important characteristic, as the denser must be capable of condensing the steam faster than an be produced by the boiler and passed through the inder. Were it not possessed of this power of rapid con- sation, the power of the engine would, as Russell observes, e, 'the elastic force of the steam above the atmosphere ld alone act, the steam being only condensed as the piston ed it out of the cylinder;' and, as he further remarks, engine would then only act as a high-pressure engine. is,' he proceeds, 'by forming a perfect vacuum in the inder on the moment when the steam is about to enter on pposite side, that the full power of the steam can alone btained in useful effect. A perfect condenser must there- have much greater capability than that of merely con- ing the steam as fast as the boiler is capable of evacuating the engine of passing it through.' While, however, so depends upon the power of the condenser, it appears there is a point beyond which attempts to render the m in the condenser more perfect fail to produce a cor- nding increase of condensing power. Referring to ell's treatise for his explanation of this matter, we can quote the important practical remark that, 'If the baro- stand at 29½ inches, the standard of this country, the m in the condenser is *too good* if it raise the barometer than 28 inches of mercury.'

r the condensation of spirituous vapours it is always ne- ry to prevent actual contact between the condensing r and the vapour upon which it acts. Such condensers lluded to under Distillation, P. C., p. 27, and a fuller unt of several contrivances for the purpose is given in Ure's 'Dictionary of Arts,' under the title 'Refrigera- of Worts.' In the article 'Cooling of Fluids,' in the work, is a minute account of a process patented by M. ne for cooling by means of a worm-pipe bound round linen or cotton-cloth, upon which a continual shower of ater is suffered to fall from a colander, the refrigerating t being produced by the consequent evaporation of the r, which draws a current of cold air up the centre of the f pipe. Of this singular scheme, so completely opposed l other plans of condensation or refrigeration, Dr. Ure ves that 'no man at all versant in the scientific doctrines, e practical application of caloric, will ever seek to le with his (the patentee's) monopoly.'

ntrivances for the condensation of air, by pressure, are ibed under Air-Gun, P. C., p. 238, and Air-Pump, ., p. 239.

NDENSER OF ELECTRICITY. Any apparatus hich the electric fluid can be accumulated may be so l, and thus every electric or galvanic battery is to be con- ed as a condenser; but the term is applied chiefly to such uments as are employed to collect and render sensible small quantities of the fluid.

e principle upon which a condenser of electricity acts may us stated. When the electricity of any body is decom- by being brought near another body which has received an object in contact with it more than its natural quantity her kind (vitreous or resinous), the fluid of that kind is led from the first body, and that of the opposite kind disposes the second body to receive a new supply of the r kind from the object with which it is connected.

For example, if a thin circular plate of metal, having attached to its circumference a glass handle, by which it may be insulated when held in the hand, be made to receive a small quantity of fluid (suppose it to be vitreous) from the conductor of an electrical machine with which it may be put in connection by a wire; and then a similar piece of metal, connected with the earth by being held in the hand or supported on a pillar of metal, be brought directly under it and so near as almost to touch it, the nearest surfaces of both having been covered with a thin coat of resinous varnish; the electricity of the latter plate will be decomposed, the vitreous portion (in the case supposed) flowing to the earth and the resinous portion being attracted, by the fluid in the plate which is connected with the conductor, to the upper surface of the other plate. This resinous fluid now attracts more of the vitreous fluid from the conductor to the under surface of the plate in connection with it, and the latter fluid further decomposes the free electricity in the former plate, thus causing in it a new repulsion of the vitreous fluid, and a new attraction of the resinous fluid to its upper surface. The like process continues till an equilibrium is produced between the vitreous fluid supplied by the conductor and the resinous fluid which is drawn from the earth.

If the plate which is connected with the conductor be now removed from thence by means of the glass handle, the fluid in it, having no means of escape, will, on the plate being presented to an electrometer, make its condensed state manifest by producing a greater effect than if the plate, while attached to the conductor, had been unaccompanied by the other plate.

Many different kinds of condensers of electricity have been constructed, and those of Volta and Cavallo have been described in the notices of the lives of those electricians [Volta, P. C., and Cavallo, P. C. S.]; but, except for some particular purposes, Coulomb's Electrical Torsion Balance [Electrometer, P. C.] may be advantageously used when it is required to determine the intensity of the fluid in any body.

CONDITION OF A BOND. [Bond, P. C.]

CONDUCTORS OF HEAT. When a bar, or column, of any solid material is in contact, at one extremity, with a body already heated, the caloric in the latter seems to combine with the nearest particles of the former; and the particles next beyond these, by their affinity for heat, attract to themselves a portion of that element: these give a portion of the heat which they have received to the next, and so on; the quantities thus received in successive laminæ of equal thickness being nearly in a decreasing geometrical progression.

The conducting powers of different solid bodies have been noticed in Abstraction and Absorption of Heat, P. C. S. With respect to liquids, the experiments which have been made to determine whether or not they are conductors of heat consist in introducing into a cylindrical vessel half filled with the fluid whose conducting power was to be examined, a quantity of heated fluid of less specific gravity, all due precautions being used to prevent the particles of the two fluids from intermixing; and it was constantly found that thermometers placed at different depths in the former indicated a gradual descent of caloric from the upper to the lower surface. By such experiments Professor Thomson, Dr. Dalton, and others, have found that, with equal volumes of the fluids, the conducting power of linseed oil is rather greater than that of water, and the conducting power of mercury about twice as great.

The conducting power of gases, if such power exist, must be extremely small. Little confidence can however be placed in the results of the experiments made to ascertain the fact, from the impossibility of discovering how much of the effect produced may be due to radiation, or to the currents in the gases under examination. Sir David Leslie inferred from his experiments that the conducting power increases as the gases are more dense; and he estimated that, in atmospheric air, it varies with the fifth root of the density.

CONFECTIONS, called also *Conserves*, or *Condita*, are formed of fresh, generally succulent, vegetable substances, in a few instances with prepared chalk, as in the aromatic confection, preserved by means of sugar or honey. These were formerly much more numerous, and were examples of the polypharmacy prevalent among our ancestors: the number might be still beneficially reduced. The quantity of sugar required to prevent them from spoiling is so great as to disagree with delicate stomachs. In several instances the ingredients are ordered to be kept apart, or if associated in a dry state, the water or syrup is to be added when the preparation is intended to be used; as in the cases of the aromatic, opiate, and almond confection. This is especially necessary in regard to the last; for if bitter almonds should be accidentally introduced, the presence of water might produce deleterious combinations.

When astringent substances such as roses are to be pounded, this process must be conducted in marble, not iron, mortars. The quantity of sugar is better to be excessive than deficient; and more is required in wet seasons than in dry. The conserves should be put into several small pots, rather than one large pot, which should be glazed with salt, as in Bristol ware, not lead. They should then be well closed, and kept in a dry cool place. Patent jars, of a very useful kind, are now manufactured for this purpose.

CONFERVA. [Water-Plants, P. C.]

CONFERVITES, species of fossil plants, probably of the Confervaceous family, occurring in the chalk of Bornholm and the south of England, in the green-sand of Maidstone, and chalk-marl of Hamsey. (Mantell.)

CONFLICT OF LAWS. [Laws, Conflict of, P. C. S.]

CONGLETON, RIGHT HONOURABLE HENRY BROOKE PARNELL, LORD, was born 3rd July, 1776, and was the second son of the Right Honourable Sir John Parnell, Chancellor of the Irish Exchequer; his mother was Letitia Charlotte, second daughter and co-heir of the Right Honourable Sir Arthur Brooke, of Colebrooke, in the county of Fermanagh, Bart. He was educated at Eton and Cambridge; and after leaving the university he spent some time abroad. It is stated in some accounts, that upon his return home 'he began his political career in the Irish parliament under the eye of his father.' His elder brother having been born a cripple, and incapable of articulating, the estates had, in 1789, been settled by act of parliament upon Henry, and he came into possession of them upon the death of his father in 1801. The baronetcy, an Irish one, fell to him upon the death of his brother in 1812.

On the 17th of February, 1801, Mr. Parnell married Lady Caroline Elizabeth Dawson, eldest daughter of John, first Earl of Portarlington, and granddaughter of the Earl of Bute, George the Third's prime minister; and at the general election in 1802 he was returned to Parliament for the borough of Portarlington, of which his father-in-law was the political patron. But a few weeks after the opening of the session he resigned his seat, by accepting the office of Escheator of Munster, to make way for Mr. (afterwards Sir) Thomas Tyrwhitt; and he remained out of parliament till March, 1806, when he was again returned as one of the members for Queen's County. This seat were commanded by the conjoint influence of his own property, of that of Lord Portarlington, and of that of Lord De Vesci, who was also his near relation, being the son of his mother's sister. Wakefield, in his 'Account of Ireland,' published in 1812, states (vol. ii. p. 308) that Lord Portarlington then commanded about 400 votes, Lord De Vesci 250, and the Parnell influence 350. Sir Henry sat in every succeeding parliament as one of the members for Queen's County, till the general election in 1832, when he declined a contest with the Repeal of the Union party, and Mr. Lalor was elected in his place. He had however previously stood three contested elections with the Tory party: in 1818 and in 1820, when he was brought in second on the poll, Mr. Wellesley Pole (the late Lord Maryborough) being first; and in 1831, when he was brought in first, Sir C. H. Coote being second. In April, 1833, he was returned for Dundee; and he was elected again for the same place in 1835 and in 1837, on the second occasion, however, not without opposition. In August, 1841, he was removed to the Upper House, by being created Baron Congleton, of Congleton, in the county of Chester. The family was originally from that county. It was the same to which the poet Parnell belonged, in whose life Dr. Johnson says, 'Thomas Parnell was the son of a Commonwealthman of the same name, who at the Restoration left Congleton, in Cheshire, where the family had been established for several centuries, and, settling in Ireland, purchased an estate, which, with his lands in Cheshire, descended to the poet.' It was a nephew of the poet who was made a baronet in 1766.

Sir Henry Parnell's political course was throughout that of
dherent to the most liberal section of the Whig, as dis-
shed from the Radical, party. In 1835, in appealing to
ectors of Dundee, he summed up the leading principles
creed and conduct as embracing triennial parliaments
e *ballot*, with an extension of the suffrage if it should
be found necessary; the speedy abolition of the
through the intervention of a gradually diminish
duty; general freedom of trade; the abolition of fl
impressment; and the substitution of a property tax (
know whether, under this phrase, he included an in
for six or seven millions of the then existing taxes.
also at all times a great advocate for economy and t
tion of taxation.

Upon the accession of the Whig ministry, in 180
made a Lord of the Treasury in Ireland. He
motion on the Civil List which dissolved the minis
Duke of Wellington in the end of 1830; and on the
of his friends to power, which followed, he was ma
tary at War. In 1832 however a difference with
leagues, on some financial points, led to his resignat
he remained out of office till the formation of Lord M
administration, in 1835, when he was made paymas
forces and treasurer of the ordnance and the n
which offices he retained till the breaking up of the
to which he belonged in August, 1841. He had al
as chairman of the finance committee appointe
House of Commons in 1828. In 1833 he was mad
ber of the government commission appointed to in
the excise; and he was also chairman of the Holyh
commission. In each of these investigations he took
part.

Besides corrected reports of five speeches which
vered in the House of Commons—on the Irish cur
1809; on Irish tithes, in 1810; on the Bullion
1811; on the state of Ireland, in 1824; and on
societies in Ireland, in 1825—Sir Henry Parnell
the following treatises and pamphlets:—'Observatio
Currency of Ireland, and upon the Course of Exc
tween London and Dublin,' 1804; 'The Principle
rency and Exchange, illustrated by Observations on
of Ireland,' 1805; 'An Historical Apology for
Catholics,' 1807; 'A History of the Penal Laws a
Irish Catholics, from the Treaty of Limerick to th
1808; 'Treatise on the Corn Trade and Agricultur
'Observations on the Irish Butter Acts,' 1825; '
tions on Paper Money, Banking, and Overtradin
'On Financial Reform,' 1830 (his principal work
times reprinted); and 'A Treatise on Roads,' 1833,
1838. (See P. C. xx. 36.)

Lord Congleton had been for some months in a
health which made it necessary that he should be
watched; but on the morning of the 8th of June, 1
ing been left for a few minutes alone, he put an e
life. Besides three daughters, he left two sons, the
whom however, the present Lord Congleton, havin
the community calling themselves the Plymouth Bre
Primitive Christians, has not taken his seat in the
Lords.

(Memoir in *Gentleman's Magazine* for August
Peerages, Baronetcies, and Sir H. Parnell's publicati

CONGLOMERATES. This term is most u
plied by geologists to designate rocks more or less
enclosing displaced fragments of mineral masses w
been consolidated at some previous epoch, and sub
broken up, removed from their original site, and
circumstances such as to permit of their being *re-aggreg*
more or less cemented together by intervening sma
ticles. Thus the old red conglomerate on the bord
Grampians is full of *fragments* of the still mor
schistose and gneissic strata, worn by attrition in w
reunited into a solid rock by interposed red sands.

In some volcanic regions the materials thrown
eruptions are re-aggregated into conglomerate, by th
tions of water.

CONO'CERAS, a genus of Cephalopoda, fossil
Huron. Bronn founds the characters of it on th
the septa, which are convex towards the base of the

CONSCIENCE, a term derived from the La
scientia,' which, as well as the word 'conscious,' run
haps nearly the same fundamental notion as the Eng
conscience.

Some remarks are made on the term Conscienc
article Moral Sense, P. C.

Bishop Butler in the preface to his sermons rem
'Man has several (instincts and principles of actio
brutes have not; particularly reflection or conscienc
probation of some principles or actions, and disap
of others.' Conscience, as thus explained, might

l approbation and disapprobation of the principles or ms of others, as well as the principles or actions of the cting agent. But from other parts of his preface it seems he limits it to a man's approbation or disapprobation of wn principles or actions; which is the ordinary meaning he word conscience, and that which is chiefly intended e.

lobody disputes that man has a moral judgment, or at t a capacity for having one; for it is possible that a man have lived under such circumstances that this moral gment has hardly ever been called into activity, just as y faculties both corporeal and mental may, for want of g exercised, never show themselves, and he who possesses m may not be conscious that he does possess them.

anguage is the chief exponent of the human mind; and language of all nations, that we know anything of, has a term by which it expresses the fact of a man reflecting his own acts and thoughts, and also some word or words which they express that a man forms a judgment upon m, that he is satisfied or dissatisfied with them, that the ection gives him pain or pleasure. But a man may er reflect on an act, which is universally called good, l be pleased with the reflection; or he may reflect on an , which the judgment of a large part of mankind may con- m, and be pleased with that reflection also. For instance, n may reflect with pleasure on an act of vengeance. not be denied that the reflection on bad acts does some- s give pleasure; but it is not certain that this pleasure mixed with some pain: it is not the reflection which ws immediately on some acts that finally determines the judgment of the agent: this judgment may not be com- ly formed until other and new circumstances have called reflection into greater activity.

ishop Butler observes, 'the very constitution of our na- requires, that we bring our whole conduct before this rior faculty (reflection or conscience); and make it the ess of our lives, as it is absolutely the whole business of ral agent, to conform ourselves to it. This is the true ing of that antient precept, *reverence* thyself.' Butler, pears, considers that conscience is a faculty, and a su- r faculty, one which exercises authority over other facul- ; and he says in another place, 'Man is thus by his very e a law to himself.'

we admit that a man does reflect on his actions and his ghts, and that he does approve or disapprove of them, it not seem material to determine, whether it is by virtue e particular faculty, or whether it is effected in some r way, either capable of explanation or incapable. The rtant fact of his exercising such judgment remains un- ted.

seems probable that a man's judgment of the conduct of rs, and his approbation or disapprobation of such conduct, h he expresses by the words right and wrong, good and is founded on his own reflex judgments. It seems to be t in our constitution that a man can not directly inflict pain nother, at least when he has no provocation, without some ng of self-disapprobation. The less directly the pain is ted, the less self-disapprobation he will feel, simply be- e the act of giving pain is less apparent to the agent. A 's general judgment of other men is and must be founded is self-experience, on his reflection on himself and his acts; and he who views any act of his own with disap- ation will view the like acts of others in the same way. who judges of the acts of others by their tendency to be rally injurious to society, never forgets himself in form- his judgment; and in proportion as his mind is more or enlarged and cultivated, he forms his judgment of the acts hers more or less with reference to mankind in general.

most stupid and ignorant of men can comprehend the er to themselves, if certain acts were not forbidden and shed.

cannot be denied that the general measure by which all kind form their judgment of any given act, is its tendency omote the general happiness, or the contrary; though they not always aware that their judgment is founded on such iderations. A single act, unimportant in itself, is judged, by its consequences only, but the consequences which ld flow from such acts being general. And this is a t way of judging of things. Acts are also judged with ence to the intention of the doer, because it is necessary scertain whether the act is from design or from accident. s it is here admitted that the general judgments of man- l upon acts and dispositions are formed by a reference, either direct and known to themselves, or secret and often hardly perceived, to the tendency of such acts and dispositions to affect the general happiness. No man contends that the conduct of men in general is immediately directed by a previous consideration of the general tendency of their actions before they do them: men act from impulse, from habit, and according to imitation, and the mass of men are guided by these three things mainly. But though no man did direct his conduct in any degree by the rule of public utility, which however is certainly not true, others form a judgment of his conduct by that rule: it is that rule and no other, combined with an estimate of his motives and dispositions, which determines whether his acts shall be called good or bad. But after a man has considered the acts and dispositions of another, and has determined that they are injurious to human happiness, why does he pronounce a judgment of disapprobation and not of approbation? and why do men, when they are agreed that the tendency of certain acts is injurious to the happiness of mankind, also agree to condemn them? If there is one man so disposed as to look with approbation on acts of cruelty, fraud, and oppression, there are thousands on the other side who look on them with abhorrence. Their disapprobation cannot be called accidental, or capricious, for it is one judgment; and when a very large number of persons coincide in one judgment, that which is the foundation of their judgment must be one. Whether the foundation is true or false is immaterial: a general agreement or conclusion must rest on one and the same foundation. Why then does a man condemn a particular act after he has satisfied himself that it tends to injure human happiness? Is it because he also would condemn his own judgment, if he did not condemn the act? If so, his reflex judgment, his conscience, is his ultimate rule. Is it simply because he sees that his approbation of what is injurious to society would itself be injurious to society, and that he is solely moved to declare his disapprobation by that consideration? It is sometimes assumed, and it seems that there are people who think, that conscience, or whatever is meant by any equivalent term, tells a man at once what is right and what is wrong. [MORAL SENSE, p. 301.] This is however a confused way of stating the thing. Conscience, or reflex judgment, may produce an opinion of an action as right or wrong, and so one man's conscience may differ from another man's as to the same action. If there is right and wrong, both judgments cannot be right. Who must settle which is right? Clearly the majority of those who are for the one or the other opinion; and it happens that a very great majority of mankind do agree in their judgment of what is right and wrong: and this agreement is the sole foundation of morals. It is a common expression that people may honestly differ in opinion as to some acts; which means no more than this, that they do not agree as to the ultimate influence of such act on the happiness of society, but that each believes that he has formed his opinion according to the best of his judgment, and that each believes that he expresses the conclusion that he has come to. When we say that each believes he has expressed the conclusion that he has come to, we mean that each has examined the matter. We do not mean that the examination of one is as complete as the examination of the other; but we mean that each has examined as well as he can, and that each thinks so, and declares his judgment accordingly. There is therefore something which comes after the judgment that is formed of the 'influence of actions, and the dispositions from which they emanate, upon human happiness,' and determines whether we shall declare that judgment, or declare something which is not that judgment: and this something we here call Conscience.

CONSCIENCE, COURTS OF. [REQUESTS, COURTS OF, P. C.]

CONSIDERATION. This is a Latin word, 'consideratio,' which, as well as the verb 'considero,' was used by Cicero and others to express 'careful observation,' or 'reflection,' or 'deliberation before action.' It has nothing to do with looking at the stars, as the Latin grammarian Festus states, but it implies something which is nearer to the business of common life than star-gazing: it implies the sitting down of a man in a place alone or with others. The word 'consideration' means 'deliberation' in the English language of common life.

But consideration has also a legal and technical meaning, which seems to flow naturally from its primary and vulgar meaning. A consideration is something which enters into all contracts, and is a part of all transfers of property, except they are made by will or testament. The following are examples of *expressed* considerations, from which examples the technical meaning of consideration may be collected:—If a man agrees to sell his land to another for 100*l*., the 100*l*. is the consideration for which he agrees to part with his land; or if a man promises to give 1000*l*. to another man if he will marry his daughter, the man is entitled to the 1000*l*. if he does marry the daughter. There is an *implied* consideration in many cases where none is expressed. A man may undertake to do a piece of work for another without any express bargain that he shall be paid; but if he does the work according to his agreement, the other man may be compelled to pay him. The implied consideration here is the implied promise to pay if the work is done.

The word consideration applies either to agreements about something which is to be done, which in England are generally called contracts, or to something that is done, some transfer of property, which is generally done by the act which is called a deed.

Contracts cannot be enforced if there is no consideration. A man may promise to give another 1000*l*., but the promise cannot be enforced unless there is a consideration, which has been defined to be a reason which moves the contracting party to enter into the contract. This is not a very good definition, but it will do; the meaning is, there must be a motive which the law considers a sufficient motive. A consideration must of course be a thing lawful.

Considerations are sometimes divided into valuable considerations and good considerations. Marriage, as in the instance just given, that is, a marriage intended, and afterwards carried into effect, is a valuable consideration; money and any other thing which is of the nature of property, and has a money value, are valuable considerations. Therefore, if a man parts with his estate for a valuable consideration, the transaction is valid, and he who gets the estate has, so far as the consideration is concerned, a good title. A good consideration is the consideration of natural affection between blood relations, and a man may give his estate to another for such a consideration. But this kind of consideration is not sufficient to maintain the validity of a conveyance of property against the claim of a subsequent purchaser for valuable consideration. Thus if a man after his marriage settles an estate upon his wife and children in consideration of his natural affection, and then sells the estate for money, the purchaser will have the estate, and not the wife and children. (Hill *v*. Bishop of Exeter, 2 Taunt. 69.) Such a settlement after marriage is called voluntary or gratuitous. A settlement of property made in consideration of a future marriage, which afterwards takes place, is a settlement for valuable consideration. The actual settlement may be made after marriage, if it is made pursuant to a written agreement entered into before marriage.

In the statute 13 Eliz. c. 5, the object of which is to prevent persons from cheating their creditors by disposing of their real or personal property, it is declared that the provisions of the act do not extend to estates or interests made or conveyed 'upon good consideration and *bonâ fide*,' and the good consideration here means money, or money's worth, or a marriage which is then intended and afterwards takes effect. Good consideration here is therefore equivalent to what has been above defined to be a valuable consideration.

The acts 27 Eliz. c. 4, and 30 Eliz. c. 18, § 3, make void, as against subsequent purchasers, all conveyances, &c. of real property which are made for the purposes of defrauding such purchasers, unless 'upon or for good consideration and *bonâ fide*.' This statute has received a singular interpretation, for it has been decided that it makes void a previous conveyance, though not made to defraud any one, if the consideration is not such as the statute intends; and accordingly, as in the case just stated, if a man settles his land after marriage on his wife and children, and then sells it, the prior settlement is void as a fraudulent conveyance.

A voluntary conveyance then by a man who is at the time insolvent, is not valid against his creditors; but if a man is not insolvent at the time, a voluntary conveyance, that is, one where there is no valuable consideration, is valid against future creditors (13 Eliz. c. 5). A conveyance for valuable consideration, such as marriage, is a valid conveyance, even if a man be insolvent at the time. An insolvent man may therefore cheat his creditors by settling his property on a woman with a view to marriage, and then marrying her; but in certain cases, such settlements are not valid against creditors when made by a person who is subject to the bankrupt laws. A voluntary conveyance is not valid against a
future purchaser for good consideration: it is a
transaction according to the construction of the 27
and as such is declared void against the purchas
purchaser knew that there was such a voluntary pr
ance, that makes no difference; his purchase is v
such conveyance.

It appears from these instances that the legal no
sideration is this:—the fact of there being a good
tion is evidence that there is no fraud, and the
it is a presumption of fraud. The doctrine of co
is intended to protect either the giver or grant
persons whom he may wish to defraud by dispo
property.

Every deed therefore or instrument by which
conveyed ought to show some consideration for
person conveys the property to another; for thoug
valid between the parties to it, when no consider
pressed, it may be invalid with respect to other p
are not parties to it. There is no absolute amount of
tion which can be legally required, but a very sm
of consideration might in some cases raise a pre
fraud, and indeed even if the amount of considerat
be the full value of the thing conveyed, it may be
in some cases to inquire whether the consideration
was actually paid.

In the case of a contract or agreement to giv
property, the necessity for a consideration is ob
for the protection of the giver, and of others to
indebted, or whom it is his moral duty to provid
contract to give can be enforced unless there is
legal consideration. An agreement to settle pro
lawful child may be such consideration; the case
gitimate child is not such a consideration. An
child is viewed as standing to his supposed father
the situation of a stranger.

Many curious legal questions have arisen on the
consideration, such for instance as the case of one
mising to pay the debt of another man. The ge
ciple is, as already stated, that there must be some
to the person promising, either certain or prospect
shall be a reasonable and sufficient inducement
promise. If a man were to give his physician a
should bind his executors to pay the physician a
after his death, a case which has happened, the
the bond might be disputed if the circumstances
it was given were such as to raise a suspicion of
instance, if no person was privy to the transaction
man and his physician, and if the sum should be
and the services of the physician altogether dispr
to the amount.

CONSTABLE, JOHN, was born at East
Suffolk, in 1776. He was the second son of
Ann Constable, and was originally intended for
but as he showed an aversion or disinclination to
father gave up this design and endeavoured to ma
of him, in which business Constable was actually
about a year. His time was, however, chiefly sp
templating and studying the beauties of natural
displayed much originality of observation in his
portraying its beauties, and his mind became gr
grossed in sketching and the study of landscape.
for art had early displayed itself; when at school
he was in the habit of neglecting his lessons for his

The result was his adoption of landscape
a profession, and in this he was instructed by R. R.
R.A., and he received much encouragement from
Beaumont. In 1795 he visited London, but retur
native place; in 1799 he again visited London w
to try his fortune, and in 1800 he was admitted as
into the Royal Academy. For many years he was
exhibitor in the Royal Academy, but his works attr
attention, owing probably to the unpretending n
extreme simplicity of his style. He professed to, and
did, despise all *styles* and conventionalities; he u
'There is room enough for a natural painter; the
of the day is *bravura*—an attempt to do somethin
the truth.' He was right; and in no great numb
his merits were acknowledged by the public.

In 1820 he took a house at Hampstead, where
resided; he had also a house in Charlotte-street,
square, where he kept a gallery of his works, f
admired, many of his paintings remained on the artis
At length in 1829 Constable received the tardy

nt of the Royal Academy; he was elected an academ on the 10th of February of that year, and when he d notice of the honour which had been done him, he d—'It has been delayed until I am desolate and impart it,' in allusion to the death of his wife, which curred only a few weeks before his election: he was his fifty-third year. He was taken ill on the night 30th of March 1837, and died in less than an hour ards.

stable has painted many excellent pictures, and all his improve much in colour by age; the 'Corn-field' in tional Gallery is a very good specimen of his style, and eed one of his best works. 'The Chain Pier at on,' 'Hampstead Heath,' and 'The Glebe Farm' are mong his best productions. His style is original and r, and his scenes are generally extremely simple, for tention was more engrossed by certain minutiæ and nt effects in nature, than by a love for the picturesque, t may be termed scenery. In one respect he carried ttention to minutiæ to an extreme, namely, the effect of orning dew. He may have fallen into this error by his f early sketching, but an exact and judicious observer ire, studying in all seasons and in all hours, could l to observe that this effect is extremely transient, but one, and not the most beautiful, of the ever varyects of nature. Constable appears to have been very influenced by his own views of things, for when a man, being asked by Sir George Beaumont what he proposed to adopt, he answered, 'None but God ity's style, Sir George.'

effect of dew, of which he was so fond, is a dis characteristic of his works, and has caused them to ed mouldy by some critics, who in the earlier part of er exercised their functions with little charity towards nter. Now, however, whether from the improvement time has effected in his colouring, or from familiarity s style, his admirers far outnumber his detractors, and tures are increasing in commercial value.

stable's character both as a man and an artist is well ed in the following account of him by his friend and academician, Mr. Uwins, in a paper read at the logical Society in 1843. 'He seemed to think that e into the world to convince mankind that nature is al. Instead of seeking for the materials of poetic pe in foreign countries amidst temples and classic or in our own amongst castles, lakes, and mountains,— ht that the simple cottage, the village green, the church, adow covered with cattle, the canal with its barges, ks and weedy banks, contained all the materials and p all the associations necessary for picture. He doted is native fields. "I love," said he, "every stile, and and lane in the village: as long as I am able to brush I shall never cease to paint them." So great a f simple truth could not tolerate the commonplaces of literature.' The freshness and novelty of his pictures, ntinues, both surprised and delighted the French s, at the time they were exhibited at the Louvre. y seemed more like the works of nature than art. The f the morning was found upon the leaves and the grass.' riginality in every art will always meet with opposition those whose ideas are bounded by the commonplaces of y. It was Constable's glory that he did not escape. lamatory judgment of the critics confirmed him in his views, and gave fresh animation to his exertions. "A connoisseur," he says, in one of his letters, "called on the other day, and told me he did not like my picture. convinces me there must be something good in it." But disgusted with the cant of ordinary criticism, he ded to hear honest John Bannister say he felt the wind ng in his face as he looked at his pictures, and Fuseli e that they made him call for his umbrella. "I care not," uld say with Sterne, "for the dogmas of the schools: let t at the feelings and the heart in any way I can."' The extract clearly points out the style of Constable, the arities of his execution and of his character, though the s of reasoning is not very evident which leads him to de that there must be something good in a picture be connoisseur dislikes it, or to lead him to feel delight e looking at his pictures makes one man feel the wind, other fancy it is going to rain. A gallery of pictures required its visitors to put on their great coats and hold ir umbrellas would be as unpleasant as peculiar.

ery elegant Life of Constable, by his friend Leslie, was published by Mr. Carpenter, with twenty-two engravings from his works, by David Lucas—'Memoirs of the Life of John Constable, Esquire, R.A., composed chiefly of his Letters. By C. R. Leslie, Esquire, R.A.' 4to., Lond. 1842.

CONSTITUTIONS AND CANONS ECCLESIASTICAL. King James I., in the first year of his reign in England, by his writ directed to the Archbishop of Canterbury, summoned and called the 'bishops, deans of cathedral churches, archdeacons, chapters and colleges, and the other clergy of every diocese within the province of Canterbury,' to meet in the Cathedral Church of St. Paul in London, to 'treat, consent, and conclude upon certain difficult and urgent affairs mentioned in the said writ.' The persons so summoned met in Convocation, and 'agreed upon certain canons, orders, ordinances, and constitutions, to the end and purpose' by the king 'limited and prescribed unto them;' to which the king, out of his 'princely inclination and royal care for the maintenance of the present estate and government of the Church of England by the laws of this realm now settled and established,' gave his royal assent by letters-patent, according to the form of the statute of the twenty-fifth year of King Henry VIII. The king, by his prerogative royal and supreme authority in causes ecclesiastical, commanded these said canons, orders, and constitutions to be diligently observed, executed, and kept by his loving subjects of the kingdom, both within the provinces of Canterbury and York, in all points wherein they do or may concern every or any of them; and the king also commanded that every minister, by whatever name or title soever he be called, shall in the parish church or chapel where he hath charge read all the said canons, orders, ordinances, and constitutions once every year, upon some Sundays or holydays, in the afternoon before divine service.

The canons and constitutions may be divided into fourteen heads, which treat as follow:—1, Of the Church of England. 2, Of divine service, and administration of the sacraments. 3, Ministers, their ordination, function, and charge. 4, Schoolmasters. 5, Things appertaining to churches. 6, Churchwardens, or quest-men, and side-men, or assistants. 7, Parish clerks. 8, Ecclesiastical Courts belonging to the archbishop's jurisdiction. 9, Ecclesiastical Courts belonging to the jurisdiction of bishops and archdeacons, and the proceedings in them. 10, Judges ecclesiastical and their surrogates. 11, Proctors. 12, Registrars. 13, Apparitors. 14, Authority of synods. The number of constitutions is one hundred and forty-one. The authority of these canons is binding on the clergy, but not on the laity, except so far as is stated under the head CANON, P. C. The authority of Canon 77 may be doubted; it is this: 'No man shall teach, either in public school or private house, but such as shall be allowed by the bishop of the diocese, or ordinary of the place, under his hand and seal; been found meet as well for his learning and dexterity in teaching, as for sober and honest conversation, and also for right understanding of God's true religion; and also except he shall first subscribe to the first and third articles afore mentioned simply, and to the first ten clauses of the second article.' The 78th Canon provides that 'curates desirous to teach shall be licensed before others:' and 79 declares 'the duty of schoolmasters.' The Constitutions and Canons Ecclesiastical have been printed by the Society for Promoting Christian Knowledge, London, 1841, together with the Thirty-Nine Articles of the Church of England.

CONTINGENT REMAINDER. [REMAINDER, P. C. and P. C. S.]

CONTRACTION, in Surgery, an abnormal and permanent alteration in the relative position and forms of parts, arising from various causes. Under the heads of ANCHYLOSIS, P. C., and DISTORTION, P. C., some of the more remarkable results of contractions have been pointed out. In this article we shall describe the nature of club-foot and wry-neck, and point out the recent mode of treating these contractions by surgical operation, which has been remarkably successful.

Club-foot, *Talipes*, is the term which has been applied to all kinds of distortion of the foot. Four species have been described—*talipes varus*, distortion of the foot inwards; *talipes valgus*, eversion of the foot; *talipes equinus*, forced extension; and *talipes calcaneus* or *talus*, extreme flexion of the foot upon the leg. Till within a recent period it was a generall received opinion that all forms of club-foot consisted in a mal formation of the bones of the tarsus, more particularly th arstragalus, and this malformation was traced to a diseased con dition of the bones. It is a curious fact however that Hipp crates attributed club-foot to the unnatural contraction of ness of ligaments and the elongation of another. Whether this be the original cause of the distortion may be doubted, but there can be no doubt as to its being a result, and that the only malformation which exists in the part is removed by relieving the contraction of the ligaments. It is however to Delpech in modern times that we are indebted for a sound view of the nature of club-foot, and more particularly for suggesting, though himself unsuccessful, the modern operation for its cure. Two cases of club-foot, which had been produced after the bones had attained their full development, led him to regard the irregular action of the muscles as the cause. To this conclusion also Stromeyer of Berlin was led by an inquiry in which he engaged, on the occurrence of paralysis in the muscles of inspiration. The following are the various sources of distortion dependent upon irregular action of the muscles, according to Dr. Stromeyer.

1. Structural changes in the muscles, inflammation and wounds with loss of substance.

2. Debility and inactivity of antagonists, produced either by excess of tension or the [illegible] of antagonist muscles, or by paralysis of the nerves of antagonist muscles.

3. Diminution of voluntary power in the entire limb through which the flexors or extensors preponderate over the extensors or flexors by the constant organic contraction of the muscles.

4. Painful affections of the part, restraining or prohibiting motion, such as that from inflammation of a joint.

5. Increased energy in the muscle, morbid contraction or motion in the muscular fibres, tonic spasm.

The various modes of treatment of club-foot formerly pursued indicated the want of a definite knowledge of its nature. They were mostly mechanical, and seldom effected the object they had in view. The mode of treatment now more generally pursued is the use of mechanical means after the performance of a surgical operation. The operation consists in dividing the tendons of the contracted muscle, which admits of the restoration of the malformed parts to their normal position, and the space between the divided ends of the tendon is filled up with new matter, and the function of the muscle is normally performed. This operation, simple as it is, was never performed till the year 1784, when Lorenz, a surgeon at Frankfort, divided the tendo-achillis for the cure of a case of club-foot, under the direction of Thilenius. This operation was afterwards unsuccessfully resorted to by Sartorius and Michaelis. In 1816 Delpech again attempted it, and upon more philosophical principles than his predecessors, but he also failed. This did not prevent Stromeyer from repeating the operation in 1831, which was perfectly successful. In 1833 and 1836 he published two memoirs, containing six successful cases. It was speedily performed again by several surgeons in England and on the Continent, and the value and utility of the operation are now universally admitted. The principal rule to be observed in the operation is not to cut through more parts than is necessary, and to divide the tendon of the contracted muscle. The division of the tendo-achillis is however only calculated to relieve talipes equinus, and the slighter cases of varus. But in the severer forms of varus, the tendons of the tibialis posticus, flexor longus pollicis, and sometimes of the tibialis posticus, require division. In valgus the tendons of the peronei as well as the tendo-achillis require division. The principal part of the treatment takes place after the operation, and consists of applying various mechanical means for the restoration of the part to their normal position. This treatment is generally commenced from two to four days after the operation. A great variety of apparatus have been designed for the purpose, but each case requires a peculiar adaptation of the means for effecting the reduction of the parts.

Club-hand does not occur so frequently as club-foot, but the distortion is of precisely the same nature, and requires for its removal the application of the same measures.

Wry-neck (*Caput obstipum*, *Torti-collis*) is a disease of the same nature as the preceding, and most frequently arises from the unequal contraction of the muscles of the neck, originating in some one of the causes previously mentioned. The consequence is that the head is permanently inclined towards one of the shoulders. Sometimes this disease arises from disease in the vertebræ or from the contraction of cicatrices after severe wounds and burns of the neck. In the former case the wry-neck can seldom be removed, but in the latter the cicatrix may sometimes be advantageously divided, and the wound allowed to heal again with the head in its natural ere it depends on contraction of the muscles the same operation may be had recourse to as is relief of club-foot and club-hand. It is a curi the operation for dividing the muscles in wry-ne recommended and practised long before it was generally applicable to the treatment of contra it is determined to treat wry-neck by mechanical out operation, the best apparatus is that of Jörg. of a pair of leather stays, and of a band or goes round the head. To the stays is attached a which runs a band to the back of the ear, in the the muscles of the neck, and which can be t means of a screw. It thus acts on the head as would do if they were in action.

Dr. Little of London has recently published a application of the Stromeyerian operation to con pending on what is called partial ankylosis. Th depend upon some organic or functional lesion o muscle, arising from one of the following causes sloughing or adhesion. 2. From spasmodic co From organic contraction through paralysis of muscles. 4. From contraction owing to long co of the limb. When this kind of ankylosis has no a great length of time, or occurs in young perso of the contracted muscle, and careful extension afterwards, is very often followed by a complete of the function of the ankylosed joint.

The same causes which produce the above-nam give rise to the irregular action of the eye calle and the operation of Stromeyer has been found pe cessful in this deformity. [SQUINTING, P. C.

(Little, *On Ankylosis*; Little, *On Club-Foot* *Surgical Dictionary*; Cooper, *First Lines of Su* ticles 'Ankylosis' and 'Club-Foot,' *Cyclopædia*

CONULA'RIA, a fossil genus of Mollus ranked with Cephalopoda, but which appears to the Pteropod genus Cymbulia. [THECOSOMATA.

CO'NULUS, a generic name for Echinida, t the term Galerites is applied.

CONVALLARITES, a genus of Liliaceous in the red-sandstone of Sulzbad. (Brongniart.)

CONVENTION TREATIES. These are trea into between different states, under which they themselves to observe certain stipulations contai treaty. In 1843 two acts were passed (6 & 7 Vic c. 76) for giving effect to conventions between and the King of the French and the United Sta America for the apprehension of certain offenders.

The act relating to France (c. 75) legalises the entered into with the government of that cou giving up of offenders who may escape from England. On requisition duly made by the Fre sador, a warrant will be issued for the apprehen tives accused of having committed the crimes of defined by the French code), attempt at murder, fraudulent bankruptcy; and any justice before may be brought is authorised to commit them t delivered up pursuant to the ambassador's requisiti of the depositions on which the original warrant duly certified as true copies, are to be received But no justice is to issue a warrant for the appr any French fugitive unless the party applying is t a warrant or document, issued by a judge or compe rity in France, authenticated in such a manner as the arrest of the supposed offender in France up charge. The secretary of state will order the mitted to be delivered up to the person or persons to receive him. If the prisoner committed shall veyed out of her Majesty's dominions within two m the time of his committal, any of her Majesty's application made to them, and after notice of such has been sent to the secretary of state (or to governor in a colony), may order such person to be unless good cause shall be shown to the contrary. to extend to all her Majesty's present or future and to continue in force during the continuance o vention.

The act relating to America (c. 76) is similar i and purposes to the one relating to France; but specified include, in addition, piracy, arson, and ro do not include fraudulent bankruptcy.

In 1844 a case occurred of a fraudulent Frenc who had escaped to England, and the French demanded that he should be given up under the

r. He was arrested and taken to prison; but before the
der could take place he applied for a writ of habeas
, on the ground that fraudulent bankruptcy was an
unknown to the law of England, and that therefore it
ntrary to law to arrest him or keep him in custody on
charge. The warrant of commitment did not specify
e prisoner should be given up on requisition duly made
ing to the act, but the words were, 'until he shall be
red by due course of law.' In consequence of the defec-
plication of the Convention Treaty in this particular case
isoner was discharged.

the close of 1843, seven persons accused of murder,
y, and piracy fled for security from Florida, in the
l States, to Nassau, one of the Bahama Islands. They
followed by a marshal of the United States, who was
ised by his government to demand that the fugitives
be given up under the Convention Act. The governor,
eorge Cockburn, issued his warrant accordingly to the
justice of the colony, authorising and directing him to
easures for the fulfilment of the act. In anticipation
application of the marshal, the chief justice had a war-
repared for apprehending the fugitives, expecting that
idence tendered would be such as could be judicially
d. The only evidence that was offered consisted
lictments, without the evidence upon which they
ramed. The act requires that copies of the depositions
which the original warrant was granted, certified, &c.,
be adduced in order to render the provisions of the act
le. The chief justice, with his associate judges, were
the necessity of refusing the warrant applied for, chiefly
following grounds:—'An indictment per se can never
eived as evidence: it is not enough for us to know that
merican jury thought the parties guilty; we ought to
the grounds upon which they thought them guilty.
may constitute the crime of murder in Florida may be
r from doing so according to the British laws, or even
laws of the Northern States of America. By issuing a
t, then, to apprehend the parties in virtue of these
nents, we might be doing so on evidence which would
stify their apprehension by the British law, and should
y be proceeding in direct violation of the act.' (*Parl.*
No. 64, Sess. 1844.)

NVERSION. [Trover, P. C.]

NY'ZA, a genus of plants belonging to the natural
Compositæ, to the suborder Tubulifloræ, the tribe
oriaceæ, the subtribe Baccharideæ, the division Co-
, and the subdivision Enconyzeæ. It has an herbaceous
ate involucre, the flowers of the ray tubular, 3-toothed,
iferous, those of the disk tubular, 5-toothed, hermaphro-
he anthers caudate, the achenium beakless, the pappus
, the receptacle naked. The species are herbs and
s, and are found in Europe, Asia, Africa, and America.

squamosa, Flea-bane, Ploughman's Spikenard, has the
of the involucre all linear, the leaves ovate-lanceolate,
y, denticulate, the lower leaves narrowed into a footstalk,
orets of the ray subligulate, the fruit terete. This is a
non plant on calcareous soils in Great Britain and
ghout Europe. It possesses a volatile oil with a pecu-
scent, and is used for the purpose of driving away fleas
gnats. It seems to have had this reputation from an early
d, as its names in most languages have reference to this
ity. Its Latin name is *pulicaria;* French, Herbes aux
s; English, Flea-bane. This species has been referred
De Candolle, in his 'Prodromus,' who is followed by
ington, in his 'Manual,' to the genus *Inla*, under the
e of *I. Conyza*.

anthelmintica has ovate or oval-oblong leaves acuminate
th ends, coarsely serrated and downy; the heads corym-
, each containing 40-50 florets; the scales of the involu-
nceolate, linear, acute, the outer somewhat spreading,
, and obovate-linear. It is a common plant among rub-
and in dry uncultivated ground in the East Indies. It is
ernonia anthelmintica of Willdenow. The fruit is used
he doctors of India as a powerful remedy for worms.

genistelloides has very small leaves reduced to sharpish
what ternate scales; 1-2 heads in interrupted spikes, the
cre turbinate, with the scales all acuminate. This plant
ative of Peru and Brazil. It is the *Baccharis genistel-*
of Persoon, the *Molina reticulata* of Lessing. It con-
a bitter extractive matter and an aromatic oil, and is not
e in its medicinal characters the common wormwood.
mployed in the Brazils in intermittent fevers, and may
d in all those cases where the Artemisia is indicated. It is particularly beneficial in the chronic diseases of horses, which are very fond of this plant. It may be employed in the form of an extract or decoction.

C. marylandica has sessile, broad-lanceolate, acute, serrated leaves; the corymbs terminal and fastigiate. It is a native of North America, and secretes a powerful volatile oil, which gives out the odour of camphor. This property is also possessed by *C. camphorata*.

(Loudon, *Encyclopædia of Plants;* Koch, *Flora Germanica;* Lindley, *Flora Medica.*)

COOLER. The Spanish word *Alcarraza*, which is referred to Cooler, P. C., signifies an earthenware vessel or pitcher, porous and unglazed, in which water is cooled by evaporation. [Evaporation, P. C. S.]

COOLEY, THOMAS, an Irish architect, born in 1740, erected what is not only one of the most elegant public buildings in Dublin, but of its kind anywhere, the Royal Exchange in that city. This structure was begun by him in 1769, and although of but moderate size is in a style at once noble and ornate; on the exterior, a Corinthian order is continued in columns and pilasters, between which there is only a single range of upper windows, the lower part of the intercolumns being filled in with solid rusticated wall, a circumstance that contributes materially to character; nor is the interior less remarkable for both elegance and commodiousness of plan, it being a rotunda inscribed within a square,—the circular part formed by a peristyle of twelve columns of the composite order, and covered by a dome. Had Cooley done nothing else, this work alone would entitle him to very high rank among his contemporaries for originality and refined taste in design. He also erected the prison called Newgate (1773), in the same city, and commenced the noble pile of the 'Four Courts,' which was begun by him in 1776, but he did not live to complete it, little more than the west wing being erected at the time of his death in 1784; after which the edifice was carried on by Gandon [Gandon, P. C. S.], with some variations from the original design.

COOPER, SAMUEL, a very distinguished English miniature painter of the seventeenth century, was born in London in 1609, and was brought up together with his brother Alexander by his uncle John Hoskins, likewise a miniature painter, and much distinguished in the reign of Charles I. Samuel Cooper soon displayed such ability as to alarm his uncle, who perceived that the works of his nephew were preferred to his own, and he accordingly took him into partnership with him, which partnership however he almost immediately dissolved again, finding the marked preference which was invariably displayed for Cooper to be intolerable. Cooper was without a rival in the time of the Commonwealth, and during the reign of Charles II. He painted the portrait of Cromwell which has been engraved by Vertue, but the head only was finished. The original is still in existence, but it has changed hands various times, and is at present, we believe, in one of the Royal collections. Walpole speaks in the highest terms of its merits; he says that if it could be enlarged to the size of one of Vandyck's portraits, the latter would lose by the comparison: he says, 'it would be an amusing trial to balance Cooper's Oliver and Vandyck's Lord Strafford.' Another of Cooper's masterpieces was a head of a person named Swingfield, which he took with him to the court of France, where it procured him the highest patronage: he remained some years in France and Holland. He was also much patronised by the court of Charles II., whose miniature he painted, as well as that of his queen: he painted also the Duchess of Cleveland, the Duke of York, Monk duke of Albemarle, Archbishop Sheldon, the Chancellor Shaftesbury, and many others. Walpole possessed a drawing by Cooper of Pope's father lying dead in his bed; Cooper's wife was the sister of Pope's mother. Cooper died in London, in 1672, in his sixty-third year, and was buried in old St. Pancras church, where a beautiful marble monument was raised to his memory, on which was inscribed a long and highly commendatory epitaph, in Latin, commencing—'Samuel Cooper, Esquire, of England the Apelles, of his age and of art the ornament,' &c. He was an excellent musician, being an admirable performer on the lute, and he was also well versed in several foreign languages. His widow was pensioned by the crown. Cooper's excellence did not extend beyond the head, but so far he was without a rival. He was particularly successful in painting hair. The following entry in one of the pocket-books of Charles, the husband of Mary Beale, shows that for a head he enjoyed the highest reputation among his contemporaries—'Sunday, May 5th, 1672, Mr. Samuel Cooper, the most famous limner of the world for a face, dyed.'

The writer of the 'Essay towards an English school,' (London, 1706,) says that Cooper acquired this great excellence by copying the pictures of Vandyck and imitating his style. 'Our nation,' he says, 'may be allowed to boast of him, having far exceeded all that went before him in England in that way (miniature), and even equalled the most famous Italians, insomuch that he was commonly styled the Vandyck in little, equalling that master in his beautiful colouring, and agreeable airs of the face, together with that strength, relievo, and noble spirit; that soft and tender liveliness of the flesh which is inimitable.' One of the chief excellences of his works is their freedom of execution, and their vigorous style, for though executed in water-colours they have the power and effect of oil paintings. Walpole makes a comparison between the works of Cooper and Oliver; he says—'Oliver's works are touched and retouched with such careful fidelity that you cannot help perceiving they are nature in the abstract; Cooper's are so bold that they seem perfect nature only of a less standard. Magnify the former, they are still diminutively conceived: if a glass could expand Cooper's pictures to the size of Vandyck's, they would appear to have been painted for that proportion.'

(*An Essay towards an English School of Painters*; Walpole, *Anecdotes of Painting in England.*)

COOPER, SIR ASTLEY, was born at the village of Brooke, in Norfolk, where his father, Dr. Cooper, was curate. His mother was a popular authoress in her day, and published several novels and other literary productions. The object of these publications was to elevate and dignify the position of woman in society.

Astley was born on the 23rd of August, 1768, and was the fourth son. As a boy he was remarkable for his liveliness and good humour, and numerous anecdotes of his boyish adventures are remembered in his family, and have been recorded with great minuteness by his nephew Mr. Bransby Cooper, in a recent memoir of his uncle. As a boy he was not remarkable for application to study, but the following incident determined his choice of surgery as a profession:—A youth had fallen down in front of a cart, one wheel of which passed over his thigh, lacerating it and wounding the femoral artery. No surgeon was near, and the boy in danger of dying from loss of blood, when young Astley Cooper bound his handkerchief sufficiently tight over the upper part of the thigh to prevent circulation in the artery, and thus stopped the bleeding till a surgeon arrived.

When in his thirteenth year his father was presented with the living of Great Yarmouth, in Norfolk, to which place he immediately removed. In August, 1784, young Cooper left home for London. His uncle William Cooper, who was then a surgeon at Guy's Hospital, not being able to receive him into his house, he was placed with Mr. Cline, who was at that time surgeon to St. Thomas's Hospital, and one of the most distinguished surgeons of his day. To his connection with Mr. Cline, and the influence of his example, Sir Astley attributed much of his success in after life.

In London he began to devote himself with earnestness to his new pursuit. He early perceived the importance of correct anatomical knowledge to the study of surgery, and made such advances by an habitual attendance in the dissecting-room, as to lead others to consult him in their difficulties. He also at this time attended the lectures of John Hunter, and was one of the few who comprehended the real value of this great man's theories and experiments. In 1787 he visited Edinburgh, and on his return was made demonstrator of anatomy at St. Thomas's Hospital. This speedily led (A.D. 1791) to his being permitted to take part of the lectures on anatomy and surgery which were then delivered, together with Mr. Cline. He was married in the same year, and after the close of the winter session paid a visit to Paris in 1792. He was here on the breaking out of the Revolution on the 10th of August; and, although at that time he sympathised with the revolutionists, he was compelled, on account of Mrs. Cooper's fears and delicate health, to return to England. In the next course of lectures which he gave he lectured on surgery alone, and this was one of the first courses in London given on that subject pendent of anatomy. It was perfectly successful. He so this year appointed professor of anatomy at Surgeons' d was re-appointed in 1794 and 1795.

arliest of Sir Astley Cooper's literary productions a volume of papers entitled 'Medical Records ,' which was published in 1798. In these essays, the caution in collecting facts, and fearlessne coming to conclusions when his facts were sufficient, w characterised him through life, are evident. Up to this although his reputation was increasing, his income was From the time he first commenced, he says, 'My receip the first year was 5l. 5s.; the second, 26l.; the third, the fourth, 96l.; the fifth, 100l.; the sixth, 200l.; the seve 400l.; the eighth, 610l.' On the death of his uncle he appointed to the office of surgeon at Guy's Hospital, but without some difficulty.

Cooper was intimate with Horne Tooke and Thelwall, others who held the same political opinions. However, before the vacancy for the surgeoncy at Guy's Hospital, interview with his friend Coleman, Cooper assured him he felt a 'disagreeable sensation' about his throat which he garded as a prelude to his fate, should he persist in his po cal conduct, and he resolved on changing his politics. This planation being deemed satisfactory by the managers of G Hospital, he was appointed surgeon in 1800. In thi the following year he read two papers before the Royal ciety, 'On the effects which take place from the destru of the membrana tympani, with an account of an operatio the removal of a particular species of deafness.' Although operation here proposed was apparently successful, its be seemed to be only transient, and it is not had recourse the present day. For these papers the author had awarded the Copleian medal of the Royal Society for 1802. In 1 he was elected a fellow of the Royal Society. In the year he took an active part in the formation of the Med Chirurgical Society, which originated in some disagree which took place in the London Medical Society— still maintains its existence. After some trouble the mem of the Medico-Chirurgical Society obtained a royal cha and it now takes the first position amongst the medical bating societies of London. In the first volume of the 'Tr actions' of this Society is recorded a case of carotid aneu in which the artery was tied by Mr. Cooper. Although case terminated unfavourably, the merit is due to him having first attempted this operation, which has been suc ful in the hands of many subsequent operators.

In 1804 he brought out the first part, and in 1807 the cond part, of his great work on Hernia. At the time he undertook inquiry into this subject, not only was the anat of the disease ill understood, but the operation for its was frequently unsuccessful. This work was publishe atlas folio, and got up in an unnecessarily expensive Most of the illustrations were of the size of life. When whole was sold, he was a loser of one thousand pounds by work. It however added greatly to his increasing repu and in a few years after this (1813) his annual income his profession amounted to twenty-one thousand pounds. income is probably the largest ever received by a me practitioner.

During the constant occupation which an enormous p tice, besides his hospital duties and lectures gave him, found time to pursue his favourite science of anatomy. had a private dissecting-room over his stables, and he employed dissectors, artists, and modellers, being pr himself every morning by six o'clock to superintend and di them for the day.

In 1813 he was appointed professor of comparative anat to the College of Surgeons, a post which he occupied ra because there was no one else to fill it, than that he himself qualified for the task. During this year he rem from the City to the West End, not only with the cultivating his interest with those about court, but also the purpose of avoiding the enormous practice of the City.

In 1817 he performed one of his most remarkable ope tions, that of tying the aorta. Although not successful, it undoubtedly the boldest attempt in the annals of surgery. any circumstances would have justified it, they were those which Cooper operated. It has been attempted since with success.

In 1818, in conjunction with his former pupil and coll Mr. Travers, he commenced publishing a series essays. Two parts of this work appeared, trea portant practical subjects in surgery, but the plan ing it was abandoned by the authors. In 1820 C called in to attend on George IV., although he held position at court. Shortly after this he removed a seba tous tumour from the head of the king. In the cour of months after this the king offered him a baronetcy, w accepted on the condition that, as he had no son,

nd to his adopted son and nephew Astley Cooper,
rs the title.

e was elected one of the Court of Examiners of
of Surgeons, and the same year brought out his
on Dislocations and Fractures. This work was
by the same diligence of research, and it was
same style as his work on Hernia, and, like that
great light on many obscure points on the anatomy
ts it treated of, as well as suggested improved
eatment.

Sir Astley Cooper was elected President of the
urgeons, an honour which he again received in
827 he lost his wife, and the grief which this
dded to previous indications of ill-health, deter-
resign practice and retire to his estate at Gades-
re he lived only a short time, and returned the
r to his practice in London. He had however
signed his lectureship at St. Thomas's, which he
ne. In 1828 he was married a second time, and
year was appointed serjeant-surgeon to the King.
was elected a Vice-President of the Royal

he published the first part of a work on the
Diseases of the Breast. This was accompanied
illustrations, and was a worthy companion to his
ks. The whole of this work was completed in
32 appeared a work of the same magnitude, on the
he Thymus Gland, which was an important addition
edge of a very obscure organ of the human body.
e same year elected a member of the Royal In-
nce, and shortly after a corresponding member
Academy of Sciences. In 1834, on the occa-
stallation of the Duke of Wellington at Oxford,
from that University the honorary degree of
vil Laws. He visited Edinburgh in 1837, where
awaited him; he was made an LL.D. of the Uni-
reedom of the city was voted to him, and a public
iven him by the College of Surgeons.

r 1840, attacks of giddiness, to which he had
increased, and he had much difficulty of breath-
symptoms increased, and he died on the 12th of
41, in the seventy-third year of his age. He
by his own desire beneath the chapel of Guy's
colossal statue by Bailey has been erected to his
t. Paul's Cathedral. In his will he left one hun-
a year to be given every third year to the best
e surgical subject.

Cooper is a striking instance of what unceasing
accomplish. As a teacher, his kindness, and the
with which he communicated his knowledge,
r above most of his contemporaries. His un-
uity in the dissecting-room enabled him to pro-
eat works which are amongst the most important
to modern surgery, and must ever give him an
ition in surgical literature. His influence on the
e day was great. 'Before his time,' says Dr.
rations were too often frightful alternatives or
npromises; and they were not seldom considered
resource of despair than as a means of remedy:
de them follow as it were in a natural course of
e gave them a scientific character; and he more-
ed in a great degree in divesting them of their
erforming them unostentatiously, simply, con-
cheerfully, and thereby inspiring the patient
relief, where previously, resignation under mis-
oo often been all that could be expected from the

of Sir Astley Cooper, Bart., by Bransby B.
itish and Foreign Medical Quarterly, vols.

ENERS. [Parceners, P. C.]

NUS, a fossil genus whose affinities are uncer-
h. 'Sil. Syst.' pl. 26, f. 12.)

, MANUFACTURE OF. In the article
C., p. 501, a description is given of the processes
and refining copper, of granulating the metal
d for the manufacture of brass, and of rolling it
n which form it is very extensively applied for
rtant purposes. We may here briefly notice
ubsequent processes in the manufacture of copper
oint out the various articles in which particulars
the manufacture of those alloys in which copper
ortant constituent.

The principal peculiarity in the manufacture of copper arises from the facility with which it may be fashioned by the hammer. The processes of casting and rolling, both of which are extensively practised in the manufacture of copper goods, so closely resemble the like operations upon other metals, that they do not require further notice; but the operations of the coppersmith are very distinct from any other branch of metallic manufactures. These are well illustrated by Mr. Dodd, in his little work on British Manufactures in Metals (Knight's 'Weekly Volume,' No. xxxviii.), by an account of the process of making a sugar-pan, like that represented under Sugar, P. C., p. 232, which consists of a circular domed vessel, with several apertures for valves, gauges, &c., and a spiral coil of copper pipe within the lower part. The top and bottom of this vessel, which are of similar shape, both being convex externally, are formed of one piece each, in the manner thus described:—'The copper is in the first place cast into a form resembling that of a double convex lens, or spectacle-glass, thickest in the middle, and diminishing gradually towards the edges. This lens is then subjected to the powerful blows of a tilt-hammer, directed more continuously near the centre than near the edges.' 'A little consideration will show,' observes our authority, 'that this hammering, while it reduces the thickness of the copper, must make it curl up at the edges, or assume a dished or hollow form: we find that this is the case even when a flat piece of metal is hammered at its centre, and still more does this result ensue when an increased substance is given to the centre.' 'The thickness of the centre,' he states, 'is so adjusted as to afford metal enough for the curvature of the vessel, and the hammering is continued till the thickness of the whole is brought nearly uniform. This is a very important process, since the fitness of the vessel for the operations of the sugar-refinery depends on the soundness and perfection of the metal. Sometimes a piece of copper, dished or hollowed in this way, and worth forty guineas if sound, is rendered useless by a flaw in the metal.'

The above description will indicate the mode in which many curved articles of copper receive their shape. Another process no less peculiar to the manufacture of copper is the hammering, technically called *planishing*, by which the metal is rendered dense and firm, and its toughness is increased; a process of so deafening a nature as to impart a singular character to a coppersmith's establishment. This operation, to revert to the language of the little work just quoted, 'has something of the picturesque effect presented by an anchor-smithery; for six or eight men, standing in a circle round the piece of copper, and each wielding a heavy hammer, strike the metal in succession, every part of the surface receiving probably as many as ten or twelve blows.' Any one who examines a large copper vessel will perceive, both in the hammer-marks and in the density and close grain of the surface, evidences of the planishing process.

By these two processes of hammering, the first to beat the copper into the required shape, and the second to condense and harden the surface when the shaping is completed, many articles which it might seem difficult to form without numerous joints are fashioned, often from masses of cast metal formed originally in a very different shape, or very much smaller and thicker than the finished articles are intended to be. In many cases, however, the hardness occasioned by the hammering impedes the shaping process, and must be repeatedly removed by annealing or softening by heat, to renew the malleability and extensibility of the metal. The principal component parts of a large copper vessel being thus formed, the next point which claims notice is the mode of joining them together. *Riveting* is a mode of fastening much employed for this purpose. In this process the edges of the adjoining plates are made to overlap, and holes are punched through the overlapping plates by a punching-engine, which cuts out a small circular piece equal in size to the rivet. The rivets, which may be compared to short, thick, blunt nails, are then inserted, and the smaller ends, which project through the holes, are spread out by the hammer so as to form what may be styled a second head. The edges of the sheets or plates of copper are finally *caulked*, or hammered until they close so perfectly as to form a joint impervious to water, air, or steam. Smaller copper vessels are united by soldering or brazing. [Soldering, P. C., p. 201.] Holland, in hi
treatise on 'Manufactures in Metal,' in Lardner's 'Cabin
Cyclopædia,' a work which enters much into the details
the working of metals, refers to a copper tea-kettle as pr
senting a familiar but ingenious specimen of the coppersmith
art, both with reference to soldering and hammeri

'Taken, indeed,' he observes, 'in all its parts, it exhibits the result of almost every operation of his workshop.' To make this article a piece of sheet copper is taken, rather longer than the intended circumference of the kettle, and some inches wider than its depth. The surface of this piece of copper, for about an inch at each end, is then brightened by filing, and one end is cut into to the depth of about an inch, and at intervals of about an inch, with a pair of shears. Every alternate portion of the cut edge is then turned a little back, so that when the plate is bent round into a cylindrical shape, the uncut end may be laid between the alternate tongues or portions of the cut edge, and embraced, as it were, by them. A little borax and solder is then applied to the joint, which is, after soldering, hammered upon a steel mandril or stake, until the seam becomes smooth, and is beaten down to the thickness of the adjoining portions of the plate. A perfect cylinder being thus formed, the next operation is to turn it inwards in a sloping direction for a space of about two inches, to form the top of the kettle, or that portion which extends from the shoulder at the top of the cylindrical side of the vessel to the edge of the opening to which the cover is fitted. This is done by hammering upon an anvil of suitable shape. About an inch of the lower end is then turned inward in the same way, and cut with the shears into tongues, which are bent back alternately in the same manner as those at the end of the plate had been. A piece of sheet copper cut to fit the end of the cylinder, so as to form the bottom of the kettle, is then inserted and united to the cylinder by the same process as that described for the first joint. The vessel is then *pickled* in diluted sulphuric acid, after which it is planished to brightness, the marks of the hammer being rendered imperceptible by the intervention of a piece of old moreen, or other woollen stuff, between the surface of the copper and the stake or anvil on which it is laid. 'The lid of the kettle,' Holland states, 'is dished by stamping it in a die; the handle is cast; and the spout, after being soldered up and rounded a little on a mandril, is finally shaped upon lead with which it has been filled, and afterwards soldered or riveted into its place.' 'Copper tea-urns and saucepans,' he adds, 'are formed by soldering and hammering in a similar manner, the former being in general finished with a beautiful colour, produced by the application of sulphate of copper or Roman vitriol, previous to the planishing or burnishing.'

Holland describes five different modes of forming copper piping out of sheet metal, in the first of which the edges of the sheet, which is curved round a mandril, are made to meet without overlapping, and united by hard solder; in the second they overlap, and are united by soft solder; in the third they overlap, and are secured by rivets; in the fourth the edges are folded together, one being bent outwards and the other brought over it and turned into the acute angle formed between the outside of the tube and the turned back edge, the whole being subsequently made close and firm by hammering; while in the fifth, which he styles the patent strip overlap, both edges of the pipe are turned back and covered with a strip of sheet metal, the two edges of which are turned in like the outer edge of the joint last described. The bending of such pipes into curved forms, as for the spiral coil in the sugar-pan described above, is a curious operation. Any attempt to bend such a tube while empty would be certain to impair its shape, and would probably occasion its fracture. To obviate this difficulty the pipe is, before bending, filled with lead, or some soft metallic alloy which will melt at a temperature which will not injure the tube. Being thus filled, the pipe may be treated as a solid bar of metal, and safely bent into any required form by suitable machinery; and when the desired curvature is gained, sufficient heat is applied to cause the contained metal to melt and flow out of the pipe.

The use of copper sheathing for ships, an application which occasions a very large demand for this metal, is alluded to under Ship-Building, P. C., pp. 395, 396, and the articles Brass, P. C., p. 353; Bronze, P. C., p. 466; and Bell-Casting, P. C. S., p. 188, treat of some of the most important manufactures of the alloys of copper. Of some of the minor articles of manufacture, in the composition of which copper forms a chief constituent, an account is given under Button, P. C., p. 70; Pin, P. C., p. 161; and Cock, P. C. S., p. 384. Of the metal button manufacture, which comprises many curious and interesting processes, a much fuller account is given in Mr. Dodd's work above quoted.

COPTIS (from κόπτω, 'to cut'), a genus of plants belonging to the natural order Ranunculaceæ. It has 5-6-sepals, coloured,
petaloid, deciduous; the petals small, cucullate;
20-25; the capsules 6-10, on long stalks, somewh
membranous, ovate, oblong, tipped with the style;

C. trifolia, Gold Thread, has ternate leaves, obo
toothed, hardly 3-lobed leaflets; the scape 1-flowe
a native of Iceland, Norway, Greenland, Siberia,
chatka, in swampy woods, and also of the ce
of North America, from Canada to Virginia. It
plant with white flowers and a yellow fibrou
which runs in all directions. The French in Ca
Tissavo-yaune-jaune. A decoction of the leaves a
used by the Indians for giving a yellow colour
skins. The rhizomata are bitter, and when admi
a medicine act in the same manner as quassia, ge
other bitters, but are not astringent.

C. asplenifolia has biternate leaves, the leaflets
natifid, very acutely serrated, the scape 2-flowered
native of Japan and the north-west coast of Americ

Both species are pretty plants, and will thrive in
A moist situation agrees with them, or they may
in pots among alpine plants. They may be prop
seeds, or by dividing the roots.

(Don, *Gardener's Dictionary*; Lindley, *Flora*

COPYHOLDS. The following remarks on
are rendered necessary by the statutes which
enacted since that article was written. By the 1st
the 1 Vict. c. 26, the last statute which relates to
Testaments, the 55 Geo. III. c. 192, and the 12th
the Statute of Frauds, are repealed; and by the
of this act of Victoria the power of disposition by
tended to customary freeholds and tenant right
all estates of a customary or copyhold tenure, w
necessity of any surrender or admittance, and notwi
the want of a custom to devise a surrender to the
will; and to all estates *pur auter vie*, whether of
freehold, tenant right, customary, or copyhold ten
4th section provides that where any real estate of
of customary freehold, or tenant right, or customar
hold, might by the custom of the manor of which
holden, have been surrendered to the use of a wil
testator shall not have surrendered the same, no pe
ing to be entitled under his will shall be entitled
mitted, except upon payment of all such stamp d
and sums of money as would have been due in resp
surrender of such estate, or the presentment, regist
enrolment of such surrender to the use of his will.
that where the testator, being entitled to admissi
real estate, and upon such admission to surrender
the use of his will, shall not have been admitted
person claiming to be entitled to such real estate
quence of such will shall be entitled to admission,
payment of all such stamp duties, fees, fine, an
money as would have been due in respect of the
of the testator to such real estate, the surrender to
his will, the presentment, registering, or enrolme
surrender; all such stamp-duties, fees, fine, or
money, to be paid in addition to the stamp-duties,
or sums of money due on the admittance of the
claiming to be entitled to such real estate.

By the 5th section, when any real estate of the
customary freehold, or tenant right, or customary
hold, is disposed of by will, the lord of the manor,
manor, of which such real estate is holden, or his
the deputy of such steward, is to cause the will
such disposition is made, or an extract thereof, to
on the Court Rolls; and when any trusts are de
the will, it is not to be necessary to enter the
of such trusts, but it is to be sufficient to state in
on the Court Rolls that such real estate is subject to
declared by the will; and when such real estate
have been disposed of by will, except by virtue o
the same fine, heriot dues, duties, and services are
and rendered by the devisee as would have been du
customary heir in case of the descent of such r
And the lord is, as against the devisee, to have the
medy for recovering and enforcing such fine, he
duties, and services as he is entitled to against the
heir in case of a descent.

By the 6th section, if no disposition by will be m
estate *pur auter vie* of a freehold nature, the same
chargeable in the hands of the heir, if it come to hi
son of special occupancy, as assets by descent, as in
of freehold land in fee simple; and in case there

t of any estate *pur auter vie*, whether freehold or
eehold, tenant right, customary or copyhold, or
tenure, and whether a corporeal or incorporeal
t, it is to go to the executor or administrator of
at had the estate by virtue of the grant; and if
ome to the executor or administrator, either by
pecial occupancy or by virtue of the act, it is to
his hands, and to go and be applied and distri-
same manner as the personal estate of the testator

By the 26th section a general device of the
ds is to include copyholds, unless a contrary in-
ar by the will; which is an alteration of the old
y copyholds did not pass under a general device
enements, and hereditaments,' or other general
iptive of real estate, unless the copyholds had
lered to the use of the will, or the testator had no
ds upon which it could operate. And besides the
oned changes relating peculiarly to copyholds, all
nactments of the act, including that which pre-
ormalities to be observed in making a will, are
estates of copyhold or customary tenure.

th section of the 1 & 2 Vict. c. 110, copyholds
bject to execution by judgment creditors in the
as freeholds.

ter changes in the nature of estates of copyhold
ry tenure are gradually taking place under the
the stat. 4 & 5 Vict. c. 35, the principal objects
—1, The commutation of certain manorial rights
lands of copyhold and customary tenure; 2, The
he enfranchisement of such lands; and 3, The
t of such tenure.

nactments with respect to the commutation of
hts are partly compulsory and partly permissive.
liefs, and services (except service at the lord's
, heriots, or money payments in lieu thereof, the
in timber, and in mines and minerals, may be
bject of compulsory commutation upon an agree-
entered into between the lord and the tenants of
t a meeting called in the way prescribed by the
n as this agreement receives the signatures of the
ts whose interests are not less than three-fourths
ch manor and lands, and of three-fourths in num-
enants, it becomes (on receiving the confirmation
issioners appointed under the act) compulsory on
all the tenants of such manor. Powers are like-
to any lord, and any one or more of the tenants,
agreement between themselves a commutation,
tary, of the above-mentioned rights or any other
lord, such as escheats, waifs, fairs, markets, &c.
ghts may be commuted either for an annual rent-
a small fixed fine not exceeding 5*s.* on death or
r for the payment of a fine on death or alienation
contingency, or at any fixed period or periods to
on between the parties: such annual rent-charge
as the case may be, if exceeding the sum of 20*s.*,
le according to the price of corn, upon the prin-
e rent-charges. After the completion of the
, the lands are to continue to be held by copy of
and to pass by surrender and admittance or other
ode of conveyance, but the customs of Borough-
Gavelkind (except in Kent), or any other cus-
of descent or custom relating to dower, free-
rtesy to which the lands may have been subject,
, and they are to be thenceforth subject to the
of descent, dower, and curtesy relating to lands
enure.

e purpose of facilitating the enfranchisement of
ds, the act enables lords of manors, whatever
extent of their interests, with the consent of the
s under the act, to enfranchise all or any of the
of their manors, in consideration of any sum or
ey payable forthwith or at a future time, accord-
ment: and tenants, whatever be the extent of
ts, are in like manner enabled, with the consent
issioners, to accept of enfranchisement on the
upon. After the completion of any such enfran-
he lands included in it are to become of freehold
ect to the consideration agreed upon for the
ent, but without prejudice to the tenant's right
nd existing limitations affecting the land.

t contains a clause applicable to cases where com-
nfranchisement has been effected, and there has
ation of the lord's right in mines and minerals,
enabling the tenants to grant to the lord such rights of entry and way, and such other easements, as may be necessary to the enjoyment of the reserved rights.

It also, after stating the doubts entertained as to the power of the courts of equity to decree a partition of lands of copyhold or customary tenure, confers that power to be exercised according to the practice of the court in freehold cases. Formerly a customary court could not be legally constituted unless two or more tenants were present to form the homage; all acts of court were by usage required to be matters of presentment by the homage; and in a great majority of manors grants could not be made nor admissions taken except at courts held within the manors. A remedy is provided for these inconveniences by clauses giving power to hold customary courts though there should be no tenant of the manor holding by copy, or though no such tenant, or not more than one such tenant, should be present; enabling lords and stewards to make grants and take admissions out of court and out of the manor: and requiring the lord forthwith, upon payment of the usual fees, to enter on the rolls all such surrenders, deeds, wills, grants, and admissions as would formerly have required the formality of a court to authorise their entry or to give them legal effect; and also declaring that no presentment of a surrender, will, or other instrument shall be essential to the validity of any such admission. But the operation of these provisions is restrained by a clause providing that wastes and commons are not to be granted or inclosed without the consent of the homage at a court duly constituted.

The act also contains a provision extending the powers of the lords and tenants of certain manors to dispose of and divide antient tenements held of the manor, subject to a due apportionment of the antient rent where a tenement is sold in parcels.

There are likewise numerous provisions in the act for defining boundaries, settling disputes, providing for cases of disability, payment of expenses, &c., similar to those in the Tithe Commutation Act, 6 & 7 Wm. IV. c. 71.

The act applies partially to the Duchy of Lancaster, but not otherwise to Crown lands, and not at all to the Duchy of Cornwall.

In the 'Third Report of the Copyhold Commissioners,' dated June 22, 1844, it is stated that 'enfranchisement of church property is now proceeding to a considerable extent, and there is every reason to suppose that in manors held by ecclesiastical persons the disposition to avail themselves of the act will become general.' The commissioners also stated that enfranchisements had also increased in other manors, but not in the same proportion, and that the act had encouraged building, especially in the neighbourhood of London. They suggested as an improvement that, without being in any way compulsory on the lord, enfranchisements might be made binding on the other tenants if two-thirds of the tenants in number and value agreed. At present it may happen that the lord is willing to enfranchise, and he can make arrangements with the principal tenants, but if there is a difficulty in agreeing with the smaller tenants, enfranchisement is hindered, as the lord might be left with the dregs of the manor

COPYING-MACHINES. The great value of a convenient and certain means of copying any piece of writing with perfect accuracy, and with less labour than is involved in the process of transcribing, has led to numerous inventions which may be classed under the general name of copying-machines, some of which are extensively used in mercantile establishments for producing duplicates of letters, invoices, and other MS. papers.

The most simple and obvious mode of effecting this object is by transferring, by means of a rolling or screw press, a portion of the ink with which a letter is written to the surface of a sheet of blank paper, prepared to receive it by damping. The transfer thus obtained is of course the reverse of the original letter, and, unless it be taken on paper so thin and transparent that it may be read through it, it must be read backwards. Watt's copying-press, referred to under WATT, P. C., p. 141, was a contrivance for obtaining transfers of this kind upon thin unsized paper, wetted, and then placed between two woollen cloths, which absorbed all unnecessary moisture. Elegant screw-presses of iron are manufactured for this purpose, of various designs, some having the power applied solely by means of a screw, turned by a transverse bar or lever, or by a cross or wheel-shaped handle, while others have also a contrivance for increasing the pressure beyond what can be conveniently applied by the simple turning of the screw. The nature of such contrivances may be conceived from those described under Screw-Press, P. C., p. 111. One of the best and simplest copying-presses is that invented by Mr. Ritchie, of Edinburgh, a cut of which is given by Hebert (*Engineer's and Mechanic's Encyclopædia*, vol. i., p. 400), in which the platten is depressed by a screw, turned by a short transverse handle, until a moderate pressure is given; after which, by the movement of a second lever-handle acting upon an excentric cam, which bears upon a piece of steel attached to the head of the screw, the screw and platten are further depressed through a very small space, but with immense force. Barlow (*Treatise on Manufactures and Machinery*, in the 'Encyclopædia Metropolitana,' section 401) describes a very simple and compact copying-machine invented by Mr. Brunel, in which the pressure is given by means of levers. In some cases, letters intended for transferring by the copying-press are written with an ink made for the purpose; and when common ink is used it may be thickened by adding a little sugar to it. In some cases the transfers are taken from the pages of a MS. book prepared for the purpose, a sheet of dry oiled paper being placed over the damp sheet to prevent the transmission of the moisture. It is almost needless to observe that transfers may be taken from several written sheets at one operation of the press.

Hebert gives the following description of a simple, and, he says, effectual copying-machine :—'Take a roller of beech, or any hard wood, about eighteen inches long and one inch in diameter, and having cut a longitudinal slit therein nearly the whole length, insert in it and fasten very neatly with glue a slip of strong cloth, about fourteen inches wide and eighteen inches long; the remaining part of the roller will serve as a handle, and may be cut with several faces to obtain a firmer hold. To use this copying-press, lay the sheet of paper on which the letter is written upon the strip of cloth; on that place the thin copying-paper, and upon these lay a thick baize or horse-hair pad; then roll the whole round the roller, and grasping that part where the cloth is with the left hand, turn the roller round with the right, gradually increasing the grasp with the left; the pressure becomes very great, and quite sufficient to transfer the letter to the copying-paper.'

Holland (*Manufactures in Metal*, in Lardner's 'Cabinet Cyclopædia,' vol. ii. p. 243) mentions a plan suggested by Dr. Franklin, which, although he styles it ineligible in practice, is worth recording as conveying an idea which might be usefully applied. He proposed to write the original letter with a gummy ink, and then to strew it over with flour-emery, which would be retained by the ink, though it would not adhere to any other part of the surface of the paper. The writing was then to be laid, face downwards, upon a smooth pewter plate, and subjected to the action of a powerful rolling-press, which, he conceived, would cause the emery to make an impression of the writing upon the surface of the metal, which might be charged with printing ink, and printed from like an engraved plate.

Mechanical contrivances for enabling a person to write with two pens or pencils at once, on different sheets of paper, on the principle of the Pantograph, P. C., p. 192, have been tried as copying-machines, but they are too complicated for ordinary use. All such machines, and perhaps we might say even the copying-press, are far surpassed in convenience by the *manifold writer*, an apparatus patented in 1806, by a person named Wedgwood. In this apparatus a sheet of paper blackened on both sides with printers' ink, and dried for five or six weeks between sheets of blotting-paper, or covered with some other black composition which will come off when pressed hard, but will not move with a slight degree of pressure or friction, is laid between two sheets of thin writing-paper, and the whole is placed upon a smooth copper or pewter plate. The letter is then written firmly on the upper sheet of paper with an agate style or point, the pressure of which causes the blackened paper to produce two impressions of the writing, one, which is read through the paper, upon the under side of the sheet directly acted upon by the style, and the other upon the upper side of the lower sheet. More than two impressions of the writing may be obtained by using two or more sheets of blackened paper, interposed between several sheets of thin white paper. This apparatus is conveniently fitted up in a small portfolio, and occupies no more room than an ordinary writing-case.

COPYRIGHT. The following additions are rendered necessary by the acts that have been passed since the article *Copyright*, P. C., was written :—

The act 5 & 6 Vict. c. 45 (Lord Mahon's Act), entitled
'An act to amend the law of copyright,' and ha
preamble, 'Whereas it is expedient to amend the
to copyright, and to afford greater encouragement
duction of literary works of lasting benefit to the
the act which now regulates literary property. It
8 Anne, c. 19; 41 Geo. III. c. 107; 54 Geo.
(P. C., viii. p. 2); and enacts that in every book
in the life-time of the author, after the passing of t
of July, 1842), the author and his assigns shall
right for the term of the author's life, and for
after his death, or if these seven years expire befo
of forty-two years from the time of publication, the
period of forty-two years; while for books previously
in which copyright still subsisted at the time of t
of the act, the copyright should be continued for th
provided in the cases of books thereafter published,
cases where the copyright should belong wholly or
a person other than the author, 'who shall have
for other consideration than that of natural love and
In these excepted cases however the author, or hi
representative, and the proprietor or proprietors of
may agree, before the expiration of the subsistin
copyright, to accept the benefits of the act: and o
of such agreement being entered in a book of registr
to be kept at Stationers' Hall, the copyright will be
as in other cases, for the author's life and seven year
death, or for forty-two years from the time of public
will be the property of the person or persons speci
minute. The copyright of a book published after th
death is to endure for forty-two years from the time
cation, and to belong to the proprietor of the manu
which it is first published, and his assigns. With
encyclopædias, reviews, magazines, periodical works
published in a series of books or parts, or any book
the publisher or projector shall have employed
write, on the terms that the copyright shall belong
the copyright shall be in the publisher or projecto
has paid for it, in the same manner and for the sa
is given to authors of books, except only in the case
articles, or portions forming part of, and first pub
reviews, magazines, or other periodical works of a li
the right of publishing which separately shall rev
authors at the end of twenty-eight years after publi
the remainder of the term given by this act; and du
twenty-eight years the publisher or projector shall
the right to publish any such essay, article, or por
rately, without the consent of the author or his assig

The act provides, at the same time, against the s
of books of importance to the public, by empoweri
dicial committee of the Privy Council, on complai
them that the proprietor of the copyright in any
the death of its author, refuses to republish or all
publication of the same, to license the complainant
the book, in such manner and subject to such co
the Privy Council may think fit.

The remedies provided by this act for infringemen
right are, an action for damages (in which the de
required, on pleading, to give notice to the plain
objections to the plaintiff's title on which he means
and a power given to the officers of customs and
seize and destroy all foreign reprints of books in wh
right exists, with a penalty on the importer (if he
proprietor of the copyright) of 10*l.*, and double th
every copy of any book imported, on conviction b
justices of the peace; 5*l.* of the penalty to go to the
customs or excise who shall procure the convictio
remainder to the proprietor of the copyright.

The act provides that a book of registry be kept a
ers' Hall, where entries may be made of proprieto
copyright, assignments thereof, licences of the jud
mittee, and agreements as to copyrights subsisting at
of the passing of the act, on payment in each case o
5*s.* The entry of proprietorship of copyright in
does not affect copyright; but no action can be br
infringement of copyright, nor any other legal pr
taken, unless the proprietorship of copyright has been

The entry of an assignment in the registry book
intents and purposes an effectual assignment. § 13,
and stamped copies of entries in the registry book
evidence in all courts of justice, and are to be taken
facie proof of copyright. The making of a false ent
registry book, or the production in evidence of a
falsely purporting to be the copy of an entry therein

or. Persons thinking themselves aggrieved by
the registry book, may apply to a court of law in
r a judge in vacation, for an order to vary or ex-
entry; and such court or judge may make an
rying, expunging, or confirming such entry, with
osts.

ect to dramatic literary property and the 3 Wm.
P. C. viii. p. 2), the 5 & 6 Vict. c. 45, has ex-
erm of the sole liberty of representing dramatic
period provided by that act for the copyright of
ives the same protection to the authors of musical
their assigns. The remedies provided by the
c. 15, in the case of dramatic pieces are confirmed
6 Vict. c. 45, and extended to musical pieces.
Vict. c. 45, also enacts that no assignment of the
any book consisting of a dramatic piece or mu-
sition shall convey the right of representing or
such dramatic piece or musical composition, unless
xpressing the intention that such right should pass
nment, be made in the registry book at Stationers'

ction given to authors by the statute of copyright
ith the condition of presenting five copies of every
ain public libraries. A copy of every work, and
ond or subsequent edition which contains any addi-
rations, bouod, sewed, or stitched together, and on
per on which the same shall be printed, is to be
the British Museum within one month after its
tion, if it is published within the bills of mortality,
ree months if published in any other part of the
gdom, or within twelve months if published in
rt of the British dominions; and a copy of every
cond or subsequent edition, containing additions
ns, on the paper of which the largest number of
be printed for sale, in the like condition as the
red for sale by the publisher, is to be delivered,
, within twelve months after publication, within
after demand made, at Stationers' Hall, for the
brary at Oxford, the Public Library at Cambridge,
of the Faculty of Advocates at Edinburgh, the
Trinity College, Dublin, under penalty of forfeit-
e of the copy of each book or edition not delivered,
ot exceeding 5*l.*, to be recovered by the Librarian,
icer properly authorised, of the library to which
ould have been delivered, on conviction before
of the peace for the county or place where the
sides, or by action of debt in any Court of Record
d Kingdom. Formerly, under the 54 Geo. III.
author was obliged to give eleven copies of his
lic libraries (P. C. viii. p. 2).

t powers given by the 5 & 6 Vict. c. 45, have
usly exercised by the Custom-house authorities,
ery effectual to prevent the importation into this
the French, Belgian, German, and American
popular English works; but English authors still
e circulation of these reprints abroad; and a prac-
uctive of the fair profits of mental labour can only
ly redressed by prevailing on foreign countries to
benefits of their own laws against literary piracy to
ell as native authors. Two statutes have been
e present reign to enable her Majesty to extend to
he benefits of our laws of copyright. The first of
2 Vict. c. 59, was repealed by 7 Vict. c. 12, the
h is now in force, and which was substituted in
e of the alterations in our law of copyright. This
d 'An Act to amend the law relating to Inter-
pyright,' empowers her Majesty by order in council
thors of works first published in foreign countries
yright in the British dominions for books, prints,
culpture, and the sole liberty of representing dra-
musical pieces, for periods not exceeding those
the various copyright acts for the respective classes
hen first published in this country, on conditions of
and delivering of one copy at Stationers' Hall;
order in council is to have any effect unless it is
in, as ground for issuing the same, that reciprocal
or British authors has been secured in the foreign
hich the order in council refers. The power given
has not yet been exercised in the case of any single
ntry.

f statutes affecting the copyright in the arts of
engraving, and etching prints, are the 8 Geo. II.
7 Geo. III. c. 38, and the 17 Geo. III. c. 57
(P. C. viii. p. 3). The 6 & 7 Will. IV. extends the provisions of the previous acts to Ireland.

With regard to designs for manufactured articles, the 27 Geo. III. c. 38, continued by 29 Geo. III. c. 19, and confirmed and made perpetual by 34 Geo. III. c. 23, gave the sole right of using a new pattern in the printing of linens, cottons, calicoes, and muslins for three months; and the 2 Vict. c. 13, extended this privilege to designs for printing other woven fabrics besides calicoes. The 2 Vict. c. 17 regulated copyright of designs in all articles except lace, and the articles to which the above-mentioned acts apply. But all these statutes were repealed by the 5 & 6 Vict. c. 100 (Mr. Emerson Tennent's Act), which considerably extended the periods of copyright in designs.

This act distributes articles to which designs may be applied into twelve classes:—

1. Articles of manufacture composed wholly or chiefly of any metal or mixed metals.
2. Articles of manufacture composed wholly or chiefly of wood.
3. Articles of manufacture composed wholly or chiefly of glass.
4. Articles of manufacture composed wholly or chiefly of earthenware.
5. Paper-hangings.
6. Carpets.
7. Shawls, where the design is applied solely by printing, or by any other process by which colours are or may hereafter be produced upon tissue or textile fabrics.
8. Shawls not comprised in class 7.
9. Yarn, thread, or warp, the design being applied by printing, or by any other process by which colours are or may hereafter be produced.
10. Woven fabrics, composed of linen, cotton, wool, silk, or hair, or of any two or more of such materials, if the design be applied by printing, or by any other process by which colours are or may hereafter be produced upon tissue or textile fabrics; except the articles included in class 11.
11. Woven fabrics composed of linen, cotton, wool, silk, or hair, or of any two or more of such materials, if the design be applied by printing, or by any other process by which colours are or may hereafter be produced upon tissue or textile fabrics, such woven fabrics being or coming within the description technically called furnitures, and the repeat of the design whereof shall be more than twelve inches by eight inches.
12. Woven fabrics not comprised in any preceding class.
13. Lace, and any article of manufacture or substance not comprised in any preceding class.

The act gives to the proprietor of a design not previously published the sole right of applying it to ornamenting articles of the first, second, third, fourth, fifth, sixth, eighth, and eleventh classes, for three years; to articles of the seventh, ninth, and tenth, for nine months; and to articles of the twelfth and thirteenth classes for twelve months; whether such design be applicable for the pattern, or for the shape and configuration, or for the ornament of the articles, or for any two or more such purposes, and by whatever means the design may be applicable, whether by printing, or by painting, or by embroidery, or by weaving, or by sewing, or by modelling, or by casting, or by embossing, or by engraving, or by staining, or by any other means whatsoever, manual, mechanical, or chemical, separate, or combined. The benefits of copyright of designs are made to depend on registration before publication. Piracy is punished by a penalty of not less than 5*l.* nor more than 30*l.*, to be paid to the proprietor of the design, and to be recovered by an action of debt or for damages, or by summary proceeding before two justices.

The law of patents in many respects resembles that of copyright. [PATENT, P. C.]

The act 'for preventing the publication of lectures without consent' (5 and 6 Wm. IV. c. 65) gives to authors of lectures the sole right and liberty of printing and publishing the same, and imposes a penalty on other persons, including printers and publishers of newspapers, who shall print, or publish, or sell them without the author's leave. The act does not extend to lectures of the delivering of which notice in writing shall not have been given to two justices, living within five miles of the place, two days at least before their delivery, or to any lecture delivered in any university, or public school or college, or any public foundation, or by individuals in virtue of any gift, endowment, or foundation. The act does not extend to sermons.

CORAL FISHERY. Coral (for a zoological account of which see Polypiaria, P. C., pp. 366-373, and the other articles there referred to,) is a marine production so nearly resembling some plants in appearance, that it has been supposed to belong to the vegetable kingdom, although it is now known to consist of the cells or habitations of minute animals, so built upon one another as to produce a branched tree-like structure, often very beautiful in form and colour, and exceedingly hard. Being much sought after, especially by the natives of India, for ornamental purposes, coral forms, in those places in which it is found of good quality, an important article of commerce. Coral was known to the antients under the name *corallium*, or κοράλλιον, and, as is shown by Pliny's description, they erroneously supposed it to be soft while in the sea, and to harden by contact with the air, or by touching with the hand. (Holland's translation of Pliny's *Natural History*, book xxxii. vol. ii. p. 429.) It is found abundantly in various parts of the Mediterranean Sea, in the Red Sea, the Persian Gulf, and several other places, in which the coral fishery forms the laborious and dangerous occupation of a large class of men. A full account of the coral fishery in the Straits of Messina is given in the fourth volume of Spallanzani's 'Travels in the Two Sicilies' (English Translation, 1798, pp. 306-329), from which it appears that the rocks which yield coral are situated in the middle of the strait, and that the parts from which it is taken vary from about 350 to 650 feet below the surface of the water. The coral here grows to about the height or length of twelve inches, and requires eight or ten years to come to perfection. The fishing-ground is therefore divided into several portions, from each of which the coral is removed only once in ten years. When taken at shorter intervals the coral is of smaller size, but it does not appear that it materially increases in length if left longer, although its stems become somewhat thicker. The free access of the rays of the sun through the water appears to be essential to the perfection of the coral, which, we are told, always grows nearly perpendicular to the surface of the rock to which it is attached, whatever the position of the rock itself may be. It is of various colours, from black or brilliant red to a dull white, and varies exceedingly in value, some selling for as much as eight or ten guineas per ounce, while other sorts are not worth a shilling per pound. The mode of conducting the fishery in various places is much the same. In that described by Spallanzani, the instrument used consists of two heavy beams of wood, secured together at right angles in the form of a cross, and loaded at their intersection with stones or other weights sufficient to sink them. A quantity of loosely twisted hemp, intermixed with coarse netting, is attached to the under side of the beams, at the ends of the cross, to the middle of which is secured one end of a strong rope by which the apparatus is let down from a boat, and guided to the spots where the coral is supposed to be most abundant. The branching form of the coral causes it to become entangled in the hemp and network attached to the cross, by which means it is broken off from the rock, and drawn up with the apparatus to the surface of the water. Owing to the great depth at which the fishery is carried on, the submarine movement and drawing up of the cross is a laborious operation, sometimes requiring the united efforts of half a dozen boats; and the men employed are exposed to considerable danger in case of the rope breaking. In Rees's 'Cyclopædia,' art. 'Coral,' where copious extracts are given from Spallanzani, there is also a notice of the machines used by the coral-fishers of Marseille, in the fishing-grounds of what is called the 'bastion of France,' one of which, called in the Provençal language the *salabre*, is intended for situations in which the bottom of the sea is rough and uneven. With a few trifling variations however, all the instruments of which we find any account consisted of weighted beams supplied with network, or some substitute for it, to entangle and break off the coral. In some cases a diver descends to guide the ends of the cross into caverns which they would not otherwise enter; and an iron hoop fixed to the beam is occasionally used to break coral from the roof or sides of caverns, a net being attached beneath it to secure what is thus broken off.

CORAL RAG, the most calcareous, or at least most coralliferous, part of the Oxford oolite formation. It is a variable and singular rock, most rich in Madrephyllicea and Echinodermata, in the vicinity of Calne.

CORALLORHI'ZA, a genus belonging to the natural order Orchideæ, and to the tribe Malaxideæ. It has a converging perianth; the lips with two prominent longitudinal *ridges* at the base, 3-lobed, the lateral lobes small, the middle lobe large, slightly emarginate; the spur short or ob the stigma triangular; the rostellum obsolete, but with a globose appendage; the anthers terminal, 2-celled, op transversely; the column elongated; the germen sl stalked, straight.

C. innata has the spur obsolete or wanting. It has fleshy roots with much branched fibres. The flower seated on a spike, and are of a yellowish colour. It is fou Great Britain in mountainous woods, but is a rare There are several American species. They are exceed difficult of cultivation.

(Babington, *Manual.*)

CORBET, RICHARD, was the son of a wealthy dener at Ewell in Surrey, whose professional skill and sonal amiability are commemorated in verses of Ben Jo He was born in 1582, and received his education at W minster school and at Christ church, Oxford, of which h came dean. After taking orders, he attained high popu in the pulpit, being, in Anthony Wood's phrase, 'a q preacher.' His talents, his social qualities, and his firm herence to the High Church party, gained for him, thr the patronage of Buckingham, the place of chaplain to J I.; and he was afterwards elevated in succession to bishopric of Oxford and to that of Norwich, each of whic held about three years. He died in possession of the l see, in 1635. Although strongly adverse to the Puri and employed by Laud in several of his proceedings ag them, he did much to mitigate the harsh commands of superior, both by forbearance in the execution of them, by the gentleness which he showed when compelled to His proved ability, his tolerance and desire for mode procedure in ecclesiastical affairs, and the cheerful kindli of his disposition, made Bishop Corbet beloved, and respected, in spite of his exuberant eccentricities. Th indeed were such as even the coarseness and freedom of m ners prevalent in that age could hardly make reconcil with the clerical character. Although we were to disbeli some of those anecdotes of unbecoming joviality collected Aubrey, there would remain evidence of extreme lightmind ness. His only published writings are his poems. Th were first collected in 1647, 12mo. under the title of 'Po Stromata;' they were reprinted in 1648 and 1672; and t were edited in 1807, 12mo., with a life of the author, Octavius Gilchrist. They are, almost without exception, cast more or less ludicrous; and several of them are satire the Puritans. They possess very much merit in their c The 'Journey to France,' and 'Farewell to the Fairies,' h been inserted in several collections of English poetry; there are others in the series which, for their humorous riment and pointed terseness, would not have been unw of the same distinction.

CORE'NZIO, BELLISA'RIO (Cavaliere), a Gr and a celebrated painter, distinguished for his ability and torious for his invidious tyranny over the painters of Naple his time, whether Neapolitans or strangers. He was five y the pupil of Tintoretto at Venice, and settled in Naples ab 1590. Here he obtained a complete ascendancy, which accomplished partly by his ability, partly by dissimulation, partly by violence. Some painters, who were of too high a to be subject to him, abstained from opposition to him thr fear, and others whom he could neither awe nor control associated with him, and these were but two, Ribera and C racciolo. Corenzio, Ribera, and Carracciolo, therefore for a triumvirate, whose object was to control all the great und takings in painting in Naples, and to allot his portion to ea And if threats, or more active persecution failed to intimid or suppress any new rival, Neapolitan or stranger, they a said to have had recourse to poison, and it is generally su posed that Domenichino was their victim. Guido Reni not give them occasion to carry their opposition to that e tremity in his case, he yielded to their threats and perse tions, glad to leave the province of such an infamous ca Annibal Carracci, Cesari, and other celebrated painters suffe similar treatment. They seem however to have been as i veterate against Neapolitans themselves as strangers, wh their jealousy was roused: Corenzio is said to have poiso with his own hand his most able scholar Luigi Rodrigo.

Corenzio, though not to be compared with Tintoretto, p sessed nearly equal boldness of manner and facility of exe tion, and he was also little inferior to him in invention. H was an able colourist in oil, but he took little pleasure in th style; his ambition was to paint great works in fresco, and executed many at Naples. In the number of his frescos een equalled by few masters, and by still fewer in their t; he could execute in a single day as much work as d occupy four painters of ordinary efficiency in the same . One of his best and greatest works, the Feeding e Five Thousand, in the refectory of the Benedictines, pied him only forty days. He died in 1643, at an ad- ed age: he was repairing one of his frescoes, when he fell the scaffolding and was killed.

ominici, *Vite dei Pittori*, &c.; Lanzi, *Storia Pittorica*,

ORIANDRUM SATI'VUM, *Medical Properties of.* umbelliferous annual plant is a native of the South of pe, Tartary, &c., and much is imported from the Levant, gh a considerable portion is cultivated in Suffolk and x, for the use of confectioners in this country. The offi- l part is the fruit, improperly called the seed. This is d, white, not unlike a grain of white pepper, and was as a means of comparison for the manna with which the lites were fed in the wilderness. (See *Exodus* xvi. 31, *Numbers* xi. 7.) The fresh fruit has a disagreeable odour, ch disappears on drying, leaving a pleasant and peculiar . The taste is warm and aromatic. The potency depends the quantity of volatile oil. Ten pounds of fruit yield drachms of volatile oil. This oil, which is of a yellowish ur, is not in the Pharmacopœia, but it may be used in the way as the other distilled waters or oils, as a carmina- . Coriander was thought better to disguise the odour and of senna than other aromatics, but in the infusion ginger w substituted for it. Making the infusion with cold water referable to either, and avoids the tendency to griping. ander is retained as an ingredient of the Confectio Sennae. is necessary to guard against confounding coriander with ed of the Daphne Mezereon, called Semen Coccognidii, latter is very poisonous.

RINNA (Κόριννα), a Greek lyric poetess, was a ter of Archelodorus or Achelodorus and Procratia, and at Tanagra in Bœotia. As she resided during some period life at Thebes, she is sometimes called a Theban. She the surname Myia (μυῖα, a fly), and is often spoken of this name alone. She lived about B.C. 500, as we must from the persons with whom she was connected, and was an of unusual beauty. She is said to have been a disciple poetess Myrtis, and to have herself instructed Pindar in uth; but afterwards to have contended with him in poeti- ntests, and to have gained five victories over him. She rs at any rate to have exercised a very great influence the developement of Pindar's youthful genius, and to recognised his extraordinary powers; for she is said to blamed Myrtis for venturing to enter into competition him. Her poems were collected and divided (probably grammarians) into five books, and in addition to this tion we have mention of epigrams and lyric nomes. But e entire poem of her's has come down to us, and only a few fragments are extant, which scarcely enable us to an idea of their merit. Her great reputation however is ed by the statues which were erected to her in several of Greece, and by the prominent place which the andrine critics assigned to her among the lyric poetesses. wrote in the Æolic dialect, which however was inter- ed with many Bœotian peculiarities. Her poems more- appear to have been principally intended for Bœotians; they abounded in allusions to Bœotian localities. From fragments extant we must infer that the subjects of some her poems were traditions about mythical heroes, and as in tion to this we are told that she wrote ἔπη, we might sup- that she also composed epic poetry, but we know from phæstion (p. 22, ed. Gaisford), that these ἔπη were con- ed in the fifth book of her poems, and that they were al odes or hymns in the heroic or epic verse. The frag- nts of Corinna's poems are collected in F. Ch. Wolf's minarum IX. Illustrium Fragmenta et Elogia,' Hamburg, 34, p. 42, &c.; in A. Schneider's 'Poetarum Græcorum gmenta,' Giessen, 1802, 8vo.; and best in Th. Bergk's etae Lyrici Graeci,' p. 811, &c.

(Comp. F. G. Welcker in Creuzer's *Meletemata*, vol. ii. p. &c.; Bode, *Geschichte der Hellenischen Dichtkunst*, vol. part 2, p. 115, &c.)

das, in his article Corinna, mentions two other lyric ses of the name of Corinna, the one of Thespiae or th, and the other, Corinna the younger of Thebes, who rnamed Myia. But these two are otherwise unknown, it is generally supposed that Suidas is blundering in his way, and has made three persons out of one.

CORIOLA'NO, the name of three celebrated engravers, chiefly in wood, in chiaroscuro. The earliest, CRISTOFORO, appears to have been a German and a native of Nürnberg, whose name, Doppelmayr supposes, was Lederer, but having settled in Italy he translated it into Coriolano. He cut, besides many other works, the very clever portraits of the second edition of Vasari, which was published at Florence in 1568. He died, according to Doppelmayr, in Venice, in 1600.

GIAMBATTISTA CORIOLANO, the next in point of time, was born at Bologna, and is supposed to have been the son of Cristoforo, but from the dates upon his works, 1619—1625, that of grandson is a more probable relationship: he died in 1649. He was the pupil of G. L. Valesio, and was painter, and engraver on copper and on wood; but he painted very little, and his cuts in wood are very few: his works consist chiefly of engravings and etchings on copper, of which Bartsch describes 223, among which are several after the Carracci and other celebrated Bolognese painters.

The most celebrated of this name was the Cavaliere BARTOLOMEO CORIOLANO, who is likewise said to have been the son of Cristoforo, but the statement in this case is still more doubtful than in that of Giambattista, for the earliest date on his works is that of 1627, twenty-seven years after the death of his reputed father, who must have been of a considerable age when he died, as he was employed by Vasari in 1568.

Bartolomeo was made Cavaliere di Loreto by Pope Urban VIII., for some prints after Guido, which he presented to his holiness: from this event he always wrote Eques after his name upon his prints.

He was one of the best of the Italian wood-engravers, and he has executed some very effective prints in chiaroscuro, after Guido and the Carracci; some with three and some with two blocks. The Fall of the Giants, after Guido, 1638, is one of his principal works; it is in four sheets, which together measure 32 inches high by 23 broad. The latest date to which his signature is found is 1647. His daughter, Teresa Maria, painted and engraved some few works.

(Doppelmayr, *Historische Nachricht*, &c.; Gandellini, *Notizie Istoriche degl' Intagliatori*, &c.; Bartsch, *Peintre Graveur*; Brulliot, *Dictionnaire des Monogrammes*, &c.)

CORMONTAINGNE (* * *) was a French engineer of the eighteenth century, who distinguished himself both by the services which he performed in the field, and by the improvements which he made in the art of fortification. He must have been born about the year 1692, for he died October 20, 1752, and he is said to have been then nearly sixty years of age; but it is remarkable that the circumstances of his early life, and even his baptismal name, have not been preserved.

The first notice which we have of him is that he was present at the siege of Fribourg in 1713, and probably he then acted as an engineer, for three years afterwards he addressed a Memoir on Fortification to M. le Pelletier de Souzi, who at that time held the rank of Intendant Général des Fortifications de France. In 1734 he was appointed by the Comte, afterwards the Maréchal Duc de Bellisle, to direct the siege of Traerbach; and when the division which performed that service rejoined the main army he accompanied it: the siege of Philisbourg being then undertaken Cormontaingne was employed to superintend the operations; and it is said that his successful attacks on two of the works were the immediate cause that the place was surrendered.

In the year 1744 he conducted, in Flanders, the sieges of Menin, Ypres, La Knoque, and Furnes; and, in Germany, that of Fribourg: at this last siege, though the casualties among the engineers were very great, the operations were conducted under the directions of Cormontaingne with the utmost regularity; and it is stated, as an example of the precision with which he formed his plans, that all the operations on the ground were exactly conformable to the written instructions which he drew up and to the sketches which accompanied them.

Subsequently to that time he was employed in inspecting the fortifications of the kingdom, from the Rhone to Calais; and, on this occasion, besides a general tract on the manner of fortifying the frontiers of a state, he wrote particular memoirs on the places of Franche Compté, Alsace, and the country between the Moselle and Calais. He was afterwards employed in superintending the constructions of new works at Strasbourg, Metz, Bitche, and Thionville: at the last of these places he resided, with the rank of Maréchal de Camp, and here his useful life terminated.

Cormontaingne wrote several memoirs relating to fortification and other branches of the military art; and that which is on the subject of the attack of fortresses, is said to have been composed, during the siege at which he served, from notes written in the trenches and on the breaches, even under the fire of the enemy. None of his writings were published during his life, except one which, without his knowledge, was printed at the Hague in 1741, under the title of 'Architecture Militaire;' and, after his death, all his papers were deposited in the Bureau de la Guerre, where they remained above thirty years. Extracts from them were, however, published, and these served as text books for the lectures given at the École du Génie, which was established at Mézières in 1750. The manuscripts were at length obtained by M. Fourcroy from the government-offices, and were published at Paris by M. Bayart, capitaine du génie, in three volumes 8vo. The first is entitled 'Mémorial pour l'Attaque des Places (1806);' the second, 'Mémorial pour la Défense des Places (1806);' and the third, 'Mémorial pour les Fortifications permanentes et passagères (1809).' An edition of the first of these works had been published by Bousmard at Berlin in 1803.

Cormontaingne did not profess to invent a system of fortification; but, by certain variations in the constructions, and by additional works, he obviated many defects which are conceived to exist in the systems of Vauban: a brief notice of his improvements, with a plan of a 'Front' according to his method, is given in FORTIFICATION, P.C., pp. 376, 377.

It is observed that Cormontaingne's 'Mémorials' are less discourses than diagrams, and that his drawings are more correct than his style, which has few pretensions to elegance. He was endowed with great activity of body and mind, and had an ardent desire to penetrate into every subject relating to his profession.

(Bousmard's account of Cormontaingne in the Preface to the *Mémorial pour l'Attaque des Places; Biographie Universelle*).

CORN-LAWS. [CORN-TRADE, P. C.; WHEAT, P. C.]

CORN-RENT is a money-rent varying in amount according to the fluctuations of the price of corn. In some countries rent is paid in the produce of the land itself; but in no part of the United Kingdom does this primitive custom exist. Some landlords in Ireland, indeed, for the accommodation of their tenants, agree to accept corn in payment of their rent, at the price of the nearest market, and ship it to England for sale; but the rent is calculated in money. (See Appendix F to *First Report of Poor Laws* (Ireland) *Commissioners*, 1836, p. 221.)

A corn-rent is founded upon the principle that a farm being assumed to grow, upon an average, a certain quantity of produce, the value of such proportion of that produce as may be agreed upon shall be paid to the landlord as rent. But as the prices of all produce are liable to considerable variation, and as the profits arising from the land must generally be mainly dependent upon the prices for which the produce is sold, it is supposed to be equitable to the farmer that the money value of that portion of the produce which he pays as rent should be calculated so as to vary with prices, instead of being determined by any arbitrary or unvarying standard. And it is undeniable that with long leases a corn-rent is a security against the growth of any serious disproportion between the rent originally agreed upon and the actual value of the produce of the land. If the farmer, under the security of a long lease, lay out capital upon the land and thus increase the quantity of produce, he derives the entire benefit arising from increased production, as the quantity to be paid as rent has already been agreed upon; and he is secured against loss caused by a fall in prices, as the amount of his rent is governed by prices.

For the purpose of assessing a corn-rent the average price of wheat alone, or of wheat and other grain, is taken—sometimes for the last year, and sometimes for a certain number of years. If the price for one year only be taken, the results to the farmer may be thus stated:—When prices are low from a limited demand for produce, his rent is reduced; and when they are low from increased production, his rent is still reduced, although he has more produce than usual to sell. When prices are high from an increased demand, he has more rent to pay, but the remunerative prices enable him to pay it easily; but when an advance of prices is caused by scarcity, his rent is raised, while the high prices may be counterbalanced by the diminished quantity of produce which he has to sell. Thus in three cases out of four a corn-rent is favourable to the farmer; and even in the fourth case he is secured from loss by its favourable operation in
In some leases also a further advantage is given
fixing a maximum price: and thus if prices shoul
rise beyond that point, he derives the whole pr
from the difference. Under this system of annu
so advantageous to the farmer, there is a certai
unfairness to the landlord, which is sometimes
assessing rent upon the average price of differe
produce for a certain number of years; by which
proportion is maintained between the money-r
average annual value realized from the land. It
principle that the tithe rent-charges are calculate
average price of grain for seven years [TITHES,
corn-rents are sometimes regulated by the scale of a
published annually for the purposes of the Tithe C
Act. In Wiltshire some farms are let in this
their number is inconsiderable. The rent of
dairy farms cannot be regulated by the ordinar
corn-averages; but in some of the dairy-farms
the rent is determined by the average price o
of cheese. In many parts of the south of Scotlan
are paid according to the *fiar* prices of corn, as de
each county by a jury summoned by the sheriff for t

The principle of a corn-rent is by no mean
origin; for by an act 18 Elizabeth, § 6, it was r
in all future leases granted by the colleges in the
of Oxford and Cambridge, and by the colleges of
and Eton, one-third part, at least, of the old r
reserved and paid in good wheat at 6*s*. 8*d*. the
under, and good malt at 5*s*. the quarter or under:
paid in ready money after the rate of the best wh
sold at the nearest market. (*Journal of the Royal*
Society, vol. v. p. 84, 177; see also Index to
Agricultural Distress, 1836.)

CORN-TRADE, ANCIENT. The product
one of the chief necessaries of life, and its con
change, have been a subject of the first importance
It is proposed here to state briefly the general n
trade in corn among two of the states of antiquity
are mainly indebted for our knowledge of the econ
dition of antient times. There are few import
questions at the present day to which we cannot
thing similar in former times; and the blunders of
gislation may still be instructive to modern statesm

Athenian Corn-Trade.—The small and co
barren territory of Attica did not produce suffici
the consumption of the inhabitants. Corn was
the Piraeus, the port of Athens, from the countri
on the Black Sea, Syria, Egypt, and other parts of
from Sicily. Demosthenes asserted (B.C. 355
Athenians imported more grain than any ot
(*Against Leptines*, c. 9). But the trade in co
Greece and the Black Sea was of some magnitud
earlier date. In B.C. 480, Xerxes, while at Aby
way to the invasion of Greece, saw the corn-shi
sailing from the Black Sea and through the Dar
carrying corn to Peloponnesus and Ægina. (He
147.) Some parts of the country on the coast o
Sea now export grain, and probably have exported
since the time of Xerxes.

The importation of grain into Attica was a mat
protected and regulated by the state; and instance
tioned of armed ships convoying the corn-vessel
Black Sea to the Piraeus. The exportation of
Attica was forbidden; and only one-third of the
that was imported into the Piraeus could be re-expor
countries: this law as to importation was enfor
overseers of the harbour. The law interfered wi
in corn in other ways also, with the intention a
keeping prices low; but with what success it is eas
ture. Engrossing or the buying-up of corn wa
offence: a man could not purchase more than
(called φορμοί). The amount of these loads canno
ascertained, nor is it material: the principle is cle
by the limitation. The penalty for violating th
death. Boeckh (*Public Economy of Athens*, E
states the law thus: 'In order to prevent the a
and hoarding of corn, engrossing was very much
it was not permitted to buy at one time more than
loads as a man could carry.' According to this a
buy fifty loads as often as he pleased at different ti
the meaning of the passage of Lysias is that a ma
buy up corn so as to have on hand more than fifty

This interpretation is consistent with the Greek, and ther is not; and it is not open to the same kind of ob- n that Boeckh's interpretation is.

e absurdity of the Athenian legislation on the trade in appears from a speech of Lysias against the corn-dealers ά τῶν Σιτοπωλῶν). The corn-dealers were generally s, and their business made them objects of popular de- tion: it was alleged that they bought up corn, and re- to sell it when it was wanted, and thus compelled the s to pay them their own price. Yet it is stated by s that the law was, that a dealer must sell his corn only obolus dearer (the medimnus?) than he bought it. Thus law attempted to fix the maximum profit of the dealers. they evaded the law, according to the same authority, by ng it a drachma (six oboli) higher on the same day: the ning of the orator here is not quite clear. The orator s that the hope of great gain made the dealers run the of the extreme penalty of the law. He urges the court ch was then sitting for the trial of some of the corn- lers whom he was prosecuting, to enforce the penalty inst them, and so make them mend their manners; and represents both the consumers and the importers of corn ffering from the combinations of the dealers. A more al instance of absurdity and commercial ignorance is not nt than this oration.

To carry the laws as to the sale of corn into effect, the henians had Corn Wardens (σιτοφύλακες) who kept an unt of the corn that was imported, inspected flour and d, and saw that they were sold of the weight and at the e fixed by law.

arious enactments were made with a view of securing a ly of corn; such as that no money should be lent on a el which did not bring back to Athens a return cargo of s, among which corn was mentioned; and that no person g in Attica should import corn to any place except the of Athens. The interests of individuals, and ultimately al interests of the community, were thus set in opposition e supposed interests of the state, and evasions of the laws ften spoken of. Individuals attempted what they will s do, to sell their grain at the dearest market. (Xeno- , *Œconom.*, c. 20.)

ere were public corn-warehouses at Athens, in which was lodged that had been purchased at the expense of tate, and sometimes, as it appears, by private contribu- . There were officers appointed to purchase the corn -buyers, σιτῶναι), and persons to give or measure it out ίκται). Corn so purchased was probably sold to the le at a low price, and sometimes also there were gratuitous ibutions of it, as at Rome; and occasionally, as at Rome presents of grain were received from foreign princes or persons, and distributed among the people gratis.

his subject has been investigated by Boeckh, *Public nomy of Athens*, translated by G. C. Lewis, 2nd edition, ed, 1842; and these remarks are mainly founded on t is said there. The subject is curious, but unfortunately must collect our information mainly from detached pas- s of the Athenian orators, who deal largely in falsehood exaggeration, and it is not possible to arrive at certainty ome points.

Roman Corn-Trade. — What we know of the antient n-trade of Italy mainly relates to the city of Rome. From early period it belonged to the administration to see that city was duly supplied with grain. The immediate ghbourhood of Rome did not supply the wants of the city, grain was imported into Rome from the country of the ci and from Cumae soon after the establishment of the ular government. (Livy, ii. 9.) An importation of corn m Sicily is mentioned by Livy (ii. 41) under the year c. 486. As the Romans extended their empire, and pro- ial governments were formed, such as those of Sicily and dinia, supplies of grain were got from foreign parts. After conquest of Sicily, the proprietors were allowed to keep ir lands on condition of paying a tenth of the produce to Romans, according to the system which had been esta- hed by King Hiero. Sardinia, after the conquest, paid ame. (Livy, xxxvi. 2). The mode of proceeding, as to tenths in Sicily, was this:—The cultivator gave notice of quantity of land he intended to sow, and an entry was e of it. The Roman State took the tenth of the produce ind, which the cultivator was bound to convey to some in Sicily, where it was embarked for Rome. All the t produced by the tenths was entered in the public books, it was all conveyed to Rome or to the armies which were serving in parts remote from Rome; this at least appears to have been the general rule.

Sometimes two-tenths of the produce were claimed by the Roman State (Livy, xxxvi. 2; xxxvii. 2), but in this case the second tenth was paid for out of the Roman Aerarium. Presents of grain from foreign states and princes were sometimes made to the Romans. (Plutarch, *C. Gracchus*, c. 2.) Thus it appears that the State undertook to provide the chief supply of grain for the city: the grain was sometimes sold, and sometimes distributed gratis among the poor, a practice which became common under the late Republic. Besides these distributions of corn at the public expense, the wealthy Romans who sought popularity sometimes made like distributions of corn among the poorer citizens, as M. Crassus the Rich did in his consulship. (Plutarch, *Crassus*, c. 2, 12.)

It does not appear, then, that the chief supply of corn for the city of Rome during the Republic was furnished in the regular way of trade. It was the business of the State to keep the proper supply of corn for the city in the public warehouses; but the supply was not always equal to the demand, and it also often happened that many people could not afford to pay the price. Scarcity was not uncommon both under the Republic and the Empire.

In Livy (iv. 12) we have a notice of the creation of a Praefectus Annonae, or Superintendent of Provision, L. Minucius, B.C. 440, in a season of scarcity. He exercised his office in an arbitrary manner, by compelling persons to state what corn they had in their possession, and to sell it; and he endeavoured to raise a popular clamour against the corn-dealers, if Frumentarii here means private dealers. Cn. Pompeius Magnus was intrusted with the superintendence of Provision for five years. (Cicero, *Ad. Attic.*, iv. 1.) Augustus, at the urgent importunity of the people, took on himself the office of Praefectus Annonae, such as Pompeius held it. (Dion Cassius, liv. 1.)

Under the early Republic many parts of Italy were well cultivated, and Rome, as already observed, derived supplies of corn from various parts of the Peninsula. But the civil wars which devastated Italy near the close of the Republic were injurious to agriculture. Murder and proscription thinned the numbers of the people, and life and property were insecure. Many of the lands changed owners, and the property of those who were cut off by violence fell into the hands of others, and chiefly of the soldiers. These and other causes made Italy less productive about the time of the Christian æra than it had been some centuries earlier. Even under the peaceable administration of Augustus, 60,000,000 modii of wheat were annually imported into Italy and Rome from Egypt and the Roman province of Africa. The modius is estimated at 1 gallon and 7·8576 pints, English measure. But this did not prevent scarcity: there was a great famine at Rome in the latter part of the administration of Augustus. (Dion Cassius, lv. 26; Vell. Paterc. ii. 104; Suetonius, *Augustus*, c. 42.) The general administration of Tiberius, the successor of Augustus, is commended by Tacitus (*Annal.* iv. 6). He endeavoured to secure a proper supply of corn by intrusting to the Publicani the management of the tenths of grain from the provinces; but there was a great famine in his time, and the high price of grain almost caused an insurrection. The emperor showed that he had not neglected this important part of the administration: he published a list of the provinces from which corn was brought, and he proved that the importation was larger than in the time of Augustus. (Tacit. *Annal.* vi. 13.) Again, under the administration of the Emperor Claudius, a famine in Rome occurred. (Tacit. *Annal.* xii. 43.) Tacitus observes that during the scarcity Claudius was assailed with menaces while he was seated on the tribunal in the forum, and he only escaped by the aid of his soldiers. He adds that there were only fifteen days' provisions in the city; and 'formerly Italy used to export supplies for the legions to distant provinces; nor is Italy now barren, but men prefer cultivating Egypt and Africa, and the existence of the Roman people is intrusted to ships and the dangers of the sea.' Claudius subsequently paid great attention to the supplying of Rome with corn. Under Nero, the successor of Claudius, there was a famine at Rome. (Suetonius, *Nero*, c. 45.)

The comparison of antient and modern prices of grain is a difficult subject, and the results hitherto obtained are not satisfactory. It is also necessary to be careful in considering the circumstances when any prices are mentioned. P. Scipio on one occasion (B.C. 200) sent a great quantity of corn from Africa, which was sold to the people at four asses the modius. (Livy, xxxi. 4.) In the same book of Livy (c. 50) another sale is mentioned at the rate of two asses the modius. But on these, as on many other occasions, these prices were not the market-prices at which wheat would have sold, but they were the lower prices at which the State sold the grain in order to relieve the citizens. Rome, both under the Republic and the early Empire, suffered occasionally from scarcity or from high prices of grain. It is possible that a supply might have readily been procured from foreign parts if there had been a body of consumers in Rome to pay for it. But the export of grain to Rome was not a regular trade; it was, as above explained, a system by which the Romans drew from their provinces a contribution of corn for the consumption of the capital, and it was not regulated by the steady demand of an industrious class who could pay for it. The reign of Tiberius appears to have been a period of scarcity; the complaints were loud, and the emperor fixed the price of corn in Rome, and he promised to give the merchants a bounty of two sesterces on the modius. This seems to mean that the emperor fixed the prices for all grain, including whatever private merchants might have; but to make them amends for any loss, he paid them part of their prices out of the treasury. After the fire at Rome, in the time of Nero, Tacitus speaks of the price of corn being lowered to three sesterces the modius. The Emperor Diocletian, by an edict, fixed the prices of all articles through the Roman Empire. The reason for this measure is stated, in the preamble to the edict, to be the high market-price of provisions, which is attributed to the avarice of the dealers, and was not limited even when there was abundance. (Inscription of Stratoniceia; see an Edict of Diocletian, fixing a maximum of prices throughout the Roman Empire, A.D. 303, by Colonel Leake, London, 1826, 8vo.)

It does not appear whether the grain which was brought to Rome from the provinces was brought in public ships, or in private ships, by persons who contracted to carry it. There seems, however, to be no doubt that there was also importation of corn by private persons, and that there were no restrictions on the trade, for the object was to get a full supply. A constitution of Valentinian and Valens (De Canone Frumentario Urbis Romæ, Cod. xi. tit. 23) declares that merchants (nautici) were to make a declaration of the grain which they imported before the governors (of provinces) and the magistrates, and that they had only good corn on board; and it was the business of the authorities to see that the grain was good. The provisioning of Constantinople, Alexandria, and probably other great cities, under the later Empire, was subject to regulations similar to those of Rome, and there were public granaries in those cities.

It is almost impossible to collect from the scattered notices in the Roman writers a just notion of the nature of the trade in grain. So far as concerns Rome, we can hardly suppose that there was a regular trade in our sense of the term. The chief supply of grain was provided by the state. That which is best left to private enterprise was undertaken by the government. It is true that the condition of Rome was peculiar under the late Republic and the Empire. The city was full of paupers, who required to be fed by occasional allowances of corn. The effect, however, of the State purchasing for the people was not a certain supply, but occasional scarcity. Whether a State undertakes to buy for the people what they may want for their consumption, or regulates the trade by interfering with the supply, is immaterial as to the result. In either case the people may expect to be starved whenever corn is scarce. The Roman system was to import all that could be got into Rome, but it was not left to private enterprise. There was no exclusion of foreign grain in order to favour the Italian farmer; nor can it be said that the Italian farmer suffered because foreign grain was brought into Rome and other parts of Italy; he could employ much of his land better than in growing corn for Rome and sending it there. Corn came from countries which were better adapted to corn-growing than many parts of Italy; and besides this, the transport of grain from many foreign parts to Rome, such as Sardinia, Sicily, and the province of Africa, would be as cheap as the transport of grain by sea from the remote parts of Italy, and much cheaper than the transport by land. The English foreign corn-trade is regulated with the avowed purpose of giving the English wheat-grower a high or what is considered a sufficient price, without any consideration of the pecuniary resources of those who have to buy corn. By interfering with the free trade in grain, the English system keeps the price unsettled, and exposes the people in times of scarcity to the danger of famine; for when a bad harvest occurs in England, the deficency must be made up from abroad, and the price must be paid for it, whatever that price may be, which must always be paid for an article that is suddenly in demand, and is not an article of regular supply. The two systems were equally bad, but bad in a different way. The Roman system was founded on ignorance of the true nature of trade, and it was closely connected with the vices of the political constitution. The English system is founded partly on ignorance, and partly on the wish of the landowners, who possess a preponderating political power, to keep up their rents, which are derived from the lands which their tenants cultivate.

The essay of Dureau de la Malle, 'De l'Economie Politique des Romains,' and the treatise of Vincentius Contarenus 'De Frumentaria Romanorum Largitione,' in Grævius, 'Antiq. Rom. Thesaurus,' vol. viii., contain most of the facts relating to the supply of corn to Rome; and both have been used for this article.

CORNBRASH, a thin calcareous member of the oolitic formations. It constitutes the uppermost band of the Bath oolite formation, and is extremely rich in Echinodermata and Conchifera, but somewhat remarkably deficient in Belemnites.

CORNEL-TREE. [CORNUS, P. C. S.]

CORNSTONE. The peculiar limestone, often mottled in colour, of the oid red-sandstone of Hereford, Salop, and South Wales, receives this title. (Murchison, 'Silurian System.')

CORNULITES, an obscurely characterized genus (of Polypiaria?), which occurs in the Silurian limestones and sandstones very frequently, as at Dudley, Usk, Marloes Bay, &c. (Murchison, 'Silurian System,' pl. 26, f. 5.)

CORNUS, a genus of plants, the type of the natural order Corneæ. It has a calyx with a very small 4-toothed limb; with four oblong sessile petals; six stamens; one style; a baccate drupe marked with traces of a calyx; the stone 2-celled, rarely 3-celled; the seeds solitary, pendulous; the albumen fleshy; the radicle of the embryo shorter than the cotyledons. The species are trees, shrubs, or low herbs, with opposite leaves, and white, sometimes yellowish flowers.

C. sanguinea, Dog-wood, Wild Cornel-tree, has arborescent straight branches; ovate cuspidate leaves, green on both sides; the cymes flat, without an involucre. This plant is a shrub, reaching a height of five or six feet. Its branches are of a reddish colour. It is a native of Great Britain, in hedges and thickets. It also inhabits North America, in Canada and New York; but has been supposed to be introduced there. It has a dark purple fruit, which is very bitter. Matthiolus says that it contains an oil which is sometimes expressed, and is used for lamps. The wood is used for making charcoal from which gunpowder is made. The fruits are sometimes mistaken for those of buckthorn, but do not possess the active properties of that plant. The wood is used for making skewers for butchers. It is called in the country Female Cornel, Prick-wood, Dogberry-tree, Hound's-tree, Gaten and Gaten-tree.

C. suecica, Dwarf Cornel, has herbaceous stems, the leaves all opposite, sessile, ovate; the nerves separate almost to the base; the flowers umbellate, shorter than the 4-leaved petaloid involucre. It is found in high mountain pastures in England and Scotland. It is not so large a plant as the last, and has purple flowers with yellow stamens. The berries are red and sweetish, and are supposed by the Highlanders to create an appetite, of which their name for them, *Lus-a-chrasis*, is expressive.

C. florida has shining branches, ovate acuminated leaves, pale beneath, beset with adpressed hairs; the flowers umbellate; the leaves of involucre large, roundish, retuse; the drupes ovate. It is a native of moist forests in the United States, especially on the borders of swamps. The bark of this tree is a powerful tonic, astringent, and antiseptic, resembling Cinchona in its action on the system, and much valued by American physicians. The young branches stripped of their bark, when rubbed against the teeth, render them extremely white. The bark of the roots yields a colouring matter which dyes cloth scarlet.

C. sericea, Silky Dogwood, has spreading branches; branchlets; ovate acuminate leaves, clothed with rubescence beneath; the corymbs depressed, woolly; the compressed. It is a native of North America, in moist It has the same properties as the last species, and is the cure of intermittent fevers. It is probable that plants contain an alkaloid identical with quinine, but not yet beeu separated.

, Male Cornel, Cornelian Cherry, has smoothish
leaves oval, acuminate, rather pubescent on both
flowers rising before the leaves; the umbels about
ength to the 4-leaved involucre; the fruit elliptic.
ive throughout the continent of Europe, but is not
Great Britain. It has yellow flowers, which are
by an elliptical fruit of a bright shining scarlet
the size and form of a small acorn. This plant was
cultivated for the sake of its fruit, but it is very in-
many others that can be more easily produced, so
not now often used. The fruit is called *Corbet* by
. The wood is very durable.

ecies of Cornus form good plants for shrubberries,
of them will grow under the drip of trees, and in
re other plants will not thrive. They may be pro-
y cuttings, layers, or suckers.

Gardener's Dictionary; Lindley, *Flora Medica*;
., *Manual of British Botany*.)

NER. The 58 Geo. III. c. 95, which made pro-
conducting the election of coroners similar to those
ection of knights of the shire, was repealed in 1844
Vict. c. 92, which substituted other regulations on
d that the former mode of election was inconvenient
led with great and unnecessary expense. This act
ly to county coroners, and the coroners of the City
and Borough of Southwark, of the Queen's House-
the Verge of the Queen's Palace, and Admiralty
are specially exempted. Counties may be divided
tices into two or more districts for the purposes of
nd alterations may be made in existing divisions.
es, in making such divisions, are in the first place
her majesty, and notice is to be given to each
the clerk of the peace of the time when the jus-
take such petition into consideration. Any coroner
nty may present a petition to her majesty touching
ed division or alteration of districts. Her majesty,
advice of the privy council, may order that such
ll be divided into so many districts as may be con-
nvenient, and determine at what place within each
e court for the election of coroner for such district
held. The justices are to direct the clerk of the
make out a list of the several parishes, townships, or
in each of the coroner's districts into which the
divided, specifying the place within each district at
court for the election of coroner is to be held, the
places at which the poll is to be taken, and the
r places attached to each polling-place. The jus-
then assign one district to each coroner; and when-
ancy occurs the election is to be made in the manner
by the act. The coroner must reside in the district
he is elected, or in some place wholly or partly
d by such district, or not more than two miles
outer boundary; the election must be made in the
nd the coroner chosen by a majority of persons duly
who shall reside in such district: no voter can poll
district where his property lies. Within not less
n or not more than fourteen days after the sheriff
received the writ De Coronatore Eligendo, he is
o hold in the district for which a vacancy has oc-
pecial county court for the election; and if a poll
ded, it may be kept open for two days, eight hours
from eight o'clock in the morning. The sheriff is
polling-booths; poll-clerks are to be sworn; and an
of poll-clerks is to be appointed on the nomination
e of the candidates. Electors may be required by
alf of any candidate to make oath respecting their
on. The result of the poll is to be declared by the
The coroner, although elected for a district, is to be
d as a coroner for the whole county; but he is only
quests within his own district, except in case of the
unavoidable absence of the coroner for another dis-
l his inquisition must certify the cause of his holding
est.

coroners were entitled to a fee of 20*s*., under 25
c. 29, and now, by 1 Vict. c. 68, to an addition of
By 7 & 8 Vict. c. 92, coroners may be paid travel-
enses, although in the exercise of their discretion
have deemed it unnecessary to hold an inquest.
paid to coroners out of the county rates in 1834 was
In 1838 and 1839 about 35,000 inquests were held
o years. By 7 & 8 Vict. coroners are prohibited from
ofessionally in any case in which they shall have sat
r

The act 1 Vict. c. 68, authorises the justices of the peace in England and Wales, at their quarter-sessions, and the town councils of every borough which has a coroner's court, at their quarterly meetings, to make a schedule of the fees, allowances, and disbursements which the coroner is allowed to pay (except the fees payable to medical witnesses, under 6 & 7 Will. IV. c. 89), on holding any inquest. This schedule regulates for each county or division of a county the expenses to be paid to the constable for summoning witnesses, &c. There is usually a small sum allowed to each juryman, generally 1*s*. 6*d*. in counties and 1*s*. in boroughs. The following are extracts from the schedule of fees settled by the magistrates of the county of Warwick, which are to be fixed by the coroner according to his discretion, but are not to exceed the sums stated :—

	s.	*d.*
To the Keeper of any Inn or other public-house for the use of a room for a dead body until the Inquest is held	20	0
To the Keeper of any Inn or other public-house for the use of a room for holding an Inquest .	5	0
To a Witness residing in the parish where the Inquest is held, for loss of time in attending to give evidence	5	0
To a Witness who does not reside in the parish, is allowed per mile	0	4
To every Witness in the three professions of law, physic, and divinity, for each day . .	42	0
To each Juryman residing in the parish where an Inquest is held	1	6
To each Juryman not residing in the parish where the Inquest is held	3	0
To any person for taking a dead body out of the water, extinguishing fire in the case of a person burning, or removing a dead body when found to some convenient place till an inquest can be held, and giving notice to the proper authorities .	7	6
To a Chemist, Engineer, or other scientific person per day	42	0
For interring the body of a *Felo de se*, including horse and cart, and other trouble (exclusive of burial fees, if any)	10	0
For digging the grave for interring the body of a *Felo de se*	3	6
To bearers of the body of a *Felo de se* . .	10	0
Coffin for a *Felo de se*	7	0

Under 7 & 8 Vict. c. 92, jurors and witnesses who neglect to attend an inquest may be fined any sum not exceeding 40*s*. The power of punishing witnesses who refuse to give evidence, for contempt of court, and the right to exclude persons from his court, are incidents of his office.

By 1 Vict. c. 68, the fees of medical witnesses are to be paid at once by the coroner, instead of by an order on the churchwardens, as directed by 6 & 7 Wm. IV. c. 89.

For their services when acting for the sheriff, coroners were not allowed any fees before the passing 7 & 8 Vict., but this statute secures to them the same amount of fees as the sheriff would be entitled to.

The average cost of the coroner's court for the borough of Birmingham, averaged 899*l*. for the five years ending 31st of December, 1844; coroner's fees, 1*l*. 6*s*. 8*d*., annually averaged 337*l*. 4*s*.; and the expense of 1416 inquests averaged 3*l*. 3*s*. 5¾*d*. each. The disbursements, independent of coroner's fees, averaged 561*l*. 8*s*. 2¾*d*. a year. In 1844 the average expenses of each inquest held in the borough of Nottingham was 19*s*. 2½*d*.; in the borough of Norwich, 1*l*. 2*s*.; in the county of Middlesex, 1*l*. 5*s*. 4*d*., including in each case the fees of medical witnesses. In the borough of Bristol the average expense of each inquest was 1*l*. 1*s*. 8*d*., exclusive of the fees to medical witnesses.

CORONILLA, a genus of plants belonging to the natural order Leguminosæ. It has a campanulate short 5-toothed calyx, with the superior teeth approximated and partially united; the claws of the petals distinctly longer than the calyx; the keel acute; the stamens diadelphous; the legume tapering, slender, finally separating into oblong 1-seeded joints; the seeds ovate or cylindrical. The species are shrubs or herbaceous plants, with unequally pinnated leaves; the peduncles axillary, bearing an umbel of stalked flowers.

C. Emerus, Scorpion-Senna, is a shrubby glabrous plant, with small stipules; 5-7 obovate leaflets; 3-5-flowered peduncles. It is a common plant all over the south of Europe, in hedges and among bushes. It has bright yellow flowers. Its leaves act as a cathartic, resembling the leaves of senna, but are less active. It is a pretty shrub, and well adapted for the front of a shrubbery. It thrives in almost any soil, and blossoms nearly all the year round.

C. varia is an herbaceous plant, with distinct lanceolate petals; the leaflets 9-13 oblong, elliptic, mucronate, the lower ones approaching the stem; the umbels 16-20 flowered; the legumes angular, very long, straight. It inhabits meadows and waste places in the South of Europe and in the Crimea. The leaves have a diuretic action on the system, and also purge. The juice is said to be poisonous when taken in large quantities; although this is the action on the human system, cattle feed on this plant with avidity, and it has been proposed to cultivate it in this country as fodder. It probably does not develop its active secretions in climates north of its native districts. In a good soil the stems grow to the height of five feet, so as amply to repay its cultivation, especially in a dry season. When once planted it is difficult to eradicate. *C. globosa* and *C. iberica* have the same tendency.

The species of Coronilla are numerous, and are all shrubs or herbs, adapted for ornamental cultivation. Of the hardy shrubby species, ripened cuttings root freely, and may be planted in open ground in the autumn. The frame and greenhouse species are of easy culture. They grow best in a mixture of loam and peat; cuttings strike readily in sand under a hand-glass, and may be turned out into the open border in spring, where they will flower all summer. Many of them are well adapted for rock-work, but are apt to be killed during a severe winter.

(Don, *Gardener's Dictionary*; Loudon, *Encyclopædia of Plants*; Lindley, *Flora Medica*.)

CORRA'DI, DOME'NICO. [GHIRLANDAIO, P. C.]

CORRECTING PLATE. [SAILING, P. C.]

CORRIGI'OLA (diminutive of *corrigia*, a shoe-string), a genus of plants belonging to the natural order Paronychieæ. It has 5 sepals slightly cohering at the base; 5 petals equalling the sepals; 5 stamens; 3 sessile stigmas; a 1-seeded indehiscent fruit; the seed suspended by its cord, which arises from the base of the capsule; the petal, as the sepal, inserted upon an obscurely perigynous ring at the bottom of the calyx. The species are procumbent glaucous herbs, with alternate stipulate leaves.

C. littoralis, Strap-wort, has the stem leafy on the part only which bears the flowers. It is the only British species of the genus. It is found on sandy shores in England, but it is not an abundant plant. There are three or four other species described, natives of America and Africa.

(Babington, *Manual of British Botany*.)

CORT, CORNELIUS, a designer and very celebrated engraver, born at Horn in Holland in 1536. He worked in his youth for Jerome Cock, a printseller of Antwerp. He went later, about 1566, to Italy, where in Venice he was received by Titian into his house, and engraved several of his pictures for him in, at that time, an unusually large size; they are dated 1566. Cort however settled finally in Rome, and established a school of engraving there, in which Agostino Caracci is said to have studied, which is doubtful, as Agostino was only twenty years of age when Cort died, if 1578, as is believed, from the letters on an old portrait, was the year of his death. Nor is there any mention that Agostino studied in Rome in his youth, nor are any of his own prints dated earlier than 1582, four years after the death of Cort.

That Agostino studied the prints of Cort is more than probable; his works are much in the same style. Cort's prints are large and his outline correct; they display great mastery of the graver, but a want of perception of the more delicate qualities, such as colour and relative distance; he was also deficient in discriminating the more delicate indications and varieties of expression. His works, for their size and style, and considering the comparative shortness of his life, forty-two years, are very numerous; they exceed one hundred and fifty. He made the first engraving after the Transfiguration by Raphael; he engraved also the Battle of the Elephants, and the Battle of Constantine, after Raphael. He executed also several prints after Federigo Zuccaro, and others after Taddeo Zuccaro, G. Muzziano, Polidoro da Carravaggio, Correggio, Michelangelo, Sabbatini, and many other celebrated masters, Italian and Flemish; and likewise some from his own designs.

(Gandellini, *Notizie Istoriche degli Intagliatori*, &c.; Heineken, *Dictionnaire des Artistes*, &c.)

CORYDA'LIS, a genus of plants belonging to the natural order Fumariaceæ. It has a calyx composed of 2 sepals, or absent; 4 petals, the upper one spurred at the base; the *stamens* diadelphous; the pod 2-valved, many seeded, compressed. The species are mostly small glaucous
ternate or pinnated leaves, and fusiform tuberous or f
Upwards of forty species of this genus have been
They are natives of the temperate parts of the
four quarters of the globe.

C. claviculata, White Climbing Fumitory, ha
root; pinnate leaves, with acuminate bracts, the
nate; footstalk ending in tendrils. It has small pal
nearly white flowers. It has a slender climbin
feet long. It is found in bushy places in hilly
Great Britain and throughout Europe.

C. lutea, Yellow Fumitory, has a fibrous root
leaves; minute oblong cuspidate bracts; shining
nulate-rugose, with a patent denticulated crest. Th
native of the South of Europe, in the fissures of ro
walls. It is now naturalized in Great Britain,
picturesque object on the old walls of ruins, as at
Derbyshire, and Fountain's Abbey, Yorkshire. I
common plant in gardens.

C. solida has a tuberous solid root, with bi
leaves, the lowest petiole a leafless scale, the bra
It is found in Great Britain, but has been u
introduced.

C. Fabacea has a nearly simple erect stem, scal
lower leaf; the leaves stalked biternate; the b
acute, longer than the pedicles. It is a nativ
mountainous places in Sweden, Denmark, and
parts of the continent of Europe. This species,
C. tuberosa, a native of the South of Europe, ha
root. The root of both the species is very bitter
acrid. That of *C. tuberosa* is hollow. On the Con
roots are used under the name of *Radix Aristoloch*
employed as external applications to indolent tumo

Many of the species are cultivated in Great B
having escaped from gardens, are occasionally f
but only *C. claviculata* is a native; *C. lutea* is
In cultivation they require a light rich soil. Th
adapted for flower-borders and rock-work. The
species may be propagated by dividing the roots,
by seeds, which should be sown where they are
remain. They will grow well under trees, if the
very dry.

(Don, *Gardener's Dictionary*; Lindley, *Flor*
Loudon, *Encyclopædia of Plants*; Babington,
British Botany.)

CORYMBI'FERÆ, one of the primary sub
the system of Jussieu, of the natural order C
comprehends most of the Tubulifloræ of De Cand
characterised by the absence of albumen, an e
hemispherical involucre, and the florets of the ray,
ligulate. This division comprises by far the larg
of the genera of the large order Compositæ.
of Corymbiferæ produce more active secretions, an
used more extensively by man than those of the
divisions of the order. They generally rep
Cichoraceæ [CICHORACEÆ, P. C. S.] in hot cl
this will perhaps account for their more active pro
Great Britain the Corymbiferæ are more num
either the Cynaraceæ or Cichoraceæ. The numbe
in Babington's 'Manual of British Botany' is—

Corymbiferæ	.	62
Cichoraceæ	.	51
Cynaraceæ	.	26
Compositæ	.	139

De Candolle estimates that the species of the
form a tenth part of the flowering plants in the wor
is about the proportion in which they occur in Gre

The following is a synopsis of the British
Corymbiferæ:—

Tribe I. EUPATORIACEÆ.
    Section I. *Eupatoreæ.*
        Eupatorium, 1 species
    Section II. *Tussilagineæ.*
        Petasites, 1 species
        Tussilago, 1 ,,
Tribe II. ASTEROIDEÆ.
    Section I. *Astereæ.*
        Aster, 1 species
        Erigeron, 3 ,,
        Bellis, 1 ,,
        Solidago, 1 ,,
        Chrysocoma, 1 ,,

Section II. *Inuleæ*.

Inula,	3 species
Pulicaria,	2 „

e III. Senecionideæ.

Section I. *Heliantheæ*.

Bidens,	2 species

Section II. *Anthemideæ*.

Anthemis,	5 species
Achillea,	4 „
Diotis,	1 „
Chrysanthemum,	2 species
Pyrethrum,	3 species
Matricaria,	1 „
Artemisia,	5 „
Tanacetum,	1 „

Section III. *Gnaphalieæ*.

Filago,	3 species
Gnaphalium,	5 „
Antennaria,	2 „

Section IV. *Senecioneæ*.

Doronicum,	2 species
Cineraria,	2 „
Senecio,	9 „

properties of this division of Compositæ are charac-

Bitterness, with an aromatic odour, is common to all
ies. Whether the bitterness depends on an alkaloid
hemists have not determined. Many of the species
properties very similar to those possessed by quinine,
administered in the same diseases as cinchona; among
e species of the genera Inula, Piqueria, Mikania, and
This bitter principle seldom however gives the
r to the plant alone, but is combined with some aro-
l, which gives the plant the properties of both a tonic
imulant. Such a combination is found in many of the
of the genera Anthemis, Artemisia, Diotis, Santolina,
themum, Eupatorium, Liatis, &c. Sometimes the vola-
s more prominent than the bitter principle; and this
is in the species of Pyrethrum, Tanacetum, Stenactis,
a, &c. In some of these the volatile oil assumes the
rs of turpentine and the oil of juniper, and acts as a
; hence a certain number of these plants have the
n of stimulating the action of the kidneys. In some
tile oil assumes an acrid character, as in Bidens, and
sialogogue, as in Pyrethrum and Spilanthes; in Maruta
iciently active to produce vomiting. In some a secre-
roduced, similar to that which gives the character to
ee. Thus Buphthalmum salicifolium is said to possess
powers, and the Arnica montana is stated by Burnett
yielded a principle identical with Cytisine, the active
e of the laburnum. Some of the species yield a
. In addition to the acrid oil in Pyrethrum officinale
a butyraceous matter, consisting principally of
. The seeds of the species of Helianthus yield a
on expression, and this is probably not confined to
s of this genus. These seeds also contain nutritive
(protein?), and are the support of birds and sometimes
in America. Another group yield colouring-matters:
is tinctoria, and the species of Calendula and Bidens,
for dyeing yellow; the Tanacetum vulgare, for dyeing
The roots of many species contain starch, and in
es large enough to afford food for man, as in the tubers
nthus tuberosus. Many of the species also yield the
form of starch known by the name of Inulin, named
e Inulas in which it was first found. Some of them
iate potash in the spots where they grow, and a species
ron is remarkable for the large quantities of this alkali
contains. Gum is a secretion found in considerable quan-
some species, as of Gnaphalium, Conyza, and Tussilago,
his account they have been used in medicine as de-
s. Tannin is not found in any quantity in this tribe
s, so that they seldom exert an astringent action upon
tem; the Achillea millefolium seems however to pos-
s property. Many of the ornaments of the garden
to the Corymbiferæ. The Dahlia, Chrysanthemum,
enum, Aster, Erigeron, Solidago, Cereopsis, and
, are amongst the genera that afford the most showy
hly valued flowers in the autumn of the year.
h the properties and uses of these plants in relation
re important, yet in proportion to the position they
in the vegetable kingdom, they are few. Many
which yield a much smaller number of species afford
ore abundant materials for the use of man.

ley, *Flora Medica*; Lindley, *Natural System*; Babington, *Manual of British Botany*; Burnett, *Outlines of Botany*.)

CORYNE'PHORUS, a genus of British grasses, belonging to the tribe Aveninea, with the following character:—Awn club-shaped, straight, jointed in the middle, the upper portion clavate, a tuft of hairs at the joint, panicle lax, glumes 2-flowered. There is but one species, *C. canescens*, which has a rather dense elongated panicle, the glumes acuminate, longer than the flower, the awn coming from near the base of the palea, the leaves setaceous. It is a native of the sandy coasts of Norfolk and Suffolk and Jersey.

(Babington, *Manual*.)

COSCINO'PORA, a genus of fossil corals, proposed by Goldfuss. C. infundibuliformis occurs in the chalk of Ireland.

COSMAS INDICOPLEUSTES. This is the name given to the author of a Greek work who lived in the sixth century of our æra, under the Emperor Justinus. Photius, who gives an account of the work in his 'Bibliotheca' (Cod. 36), says that the title is *Χριστιανῶν βίβλος ἑρμηνεία εἰς τὴν ὀκτατευχον*, 'A Book of the Christians, an Exposition on the Octateuch.' This is the literal version of the title; but it is observed that the title does not agree with the contents, which are not an exposition on the first eight books of the Holy Scriptures; and accordingly the title is explained by some critics to mean a work in eight books For though there are twelve books, Photius speaks of the last four as not dedicated to any person, while the first six are dedicated to Pamphilus, the seventh to Anastasius, and the eighth to Peter.

The work as it exists in the MSS. is entitled *Χριστιανικὴ τοπογραφία παντὸς κόσμου*, 'Christian Description of the Whole World.' Photius does not mention the writer's name; and it has been conjectured that the name Cosmas Indicopleustes, or Indopleustes, has been given to the unknown author, from the title of his work Cosmus (Κόσμος), and the fact of his having travelled to India. He had seen India and Ceylon, and acccordingly it has been conjectured that he was originally a merchant.

The object of Cosmas was to reconcile the natural phenomena of the universe with the account in the Bible. He says that the habitable earth is flat and rectangular, the length being twice the breadth, and that it is surrounded by the ocean, which flows into the earth by four passages, the Mediterranean Sea, the Caspian, the Arabian Gulf, and the Persian Gulf. The opinion that the Caspian communicated with the ocean was firmly established before the time of Cosmas, though Herodotus, 450 years before the Christian æra, had declared that the Caspian was a lake. The rest of his cosmography is of a piece with that which has been stated.

In the second book the author speaks of the monument of Adule, which he had seen, and which he has transcribed into his work. [Adule, P. C.] In the eleventh book he gives a description of Taprobane, or Ceylon, and the animals of India. The work of Cosmas is of some value, owing to the passages that he cites from authors who are now lost. The Christian Topography is printed in B. Montfaucon's 'Collectio Nova Patrum,' Paris, 1707, fol. The description of Ceylon and of the products of India was edited by M. Thevenot, with a French translation, in the first volume of the 'Relations des divers Voyages curieux,' Paris, 1666, fol.

(Fabricius, *Biblioth. Graeca*, iv. p. 251, edit. Harles; Schoell, *Geschichte der Griech. Litt.* iii. 327.)

COSTUS. [Putchuk, P. C.]

COSWAY, RICHARD, R.A., was born in 1740, at Tiverton in Devonshire, where his family, originally Flemish, had been long settled, and his father was master of the public school. He was placed by his uncle, the mayor of Tiverton, with Hudson, and afterwards at Shipley's drawing-school in the Strand. Smith, in his Life of Nollekens, gives a different account. He speaks of him as Shipley's servant, who waited upon the pupils at the school; a very improbable story, judging from Cosway's connexions. However, at this time Cosway was very diligent: he obtained in a few years, between the fourteenth and twenty-fourth years of his age, five premiums from the Society of Arts. His chief excellence was in miniature painting, for which he had very great ability, and in which, professionally, he was successful to the utmost degree. He was patronized by all the rank and wealth of his time: the Prince of Wales, afterwards George IV., was among his friends and patrons. He made a large income; but he was sumptuous and hospitable in his habits, and his expenditure probably kept pace with his income.

He was elected a member of the Royal Academy at the same time with Nollekens and Barry, in 1771, according to

Smith, and, as if in acknowledgment of the honour, he painted several fancy portraits for its exhibitions. He exhibited 'Rinaldo and Armida,' 'Cupid,' 'St. John,' 'Venus and Cupid,' 'Madonna and Child,' and 'Psyche,' all of which were portraits of some of his titled patrons, good likenesses, and successful works in their style.

About this time he was married to Maria Hadfield, though of English parentage, a native of Leghorn, where her father had kept an hotel which was much frequented by English travellers. The late Charles Townley, collector of the Townley marbles, gave the bride away. Her story is remarkable: she was the fifth child of her parents, but the four elder children had all died in a remarkably sudden manner when infants, facts which had excited many strange surmises. Soon after the birth of Maria however the mystery was explained. One day a favourite maid-servant went into the nursery, and taking up the child and dandling it, said, 'Pretty little creature! I have sent four before thee to heaven: I hope to send thee also.' This extraordinary speech, which was overheard by another servant, caused the arrest and examination of the girl, who confessed that she had herself destroyed the other four children out of love, 'for of such was the kingdom of heaven.' The deluded creature was imprisoned for life. Maria was placed in a convent to be educated, where she was taught music and drawing; arts which she eventually pursued with such success as to excite universal admiration, in Italy and in England, wherever she was known. After her marriage with Cosway she became a very distinguished exhibiter at the Royal Academy, and her musical parties, in which she was the chief performer, at her house, formerly Astley's, in Pall-Mall, and afterwards at 20, Stratford Place, Oxford Street, were among the chief attractions of the age. 'The guests were numerous, and of all ranks and callings that had any pretensions to the elegant; the writer of the last new poem; the speaker of the last best speech in the Commons; some rising star, real or imaginary, in art; the man who made the last miraculous escape from shipwreck, or who had walked into the remotest latitude: in short, all the lions of London were there, to see and be seen. Lady Lyttleton, the Honourable Mrs. Damer, the Countess of Aylesbury, Lady Cecilia Johnston, and the Marchioness of Townshend, were her intimate friends. General Paoli, Lord Sandys, Lord Erskine, and the Prince of Wales, were not unfrequent visitors; and when she desired to have something worthy of public notice, the foreign ambassadors were ready to swell the number of those who listened to the music of the charming Mrs. Cosway.'

The house in which these parties were held was furnished in the most costly and gorgeous style imaginable: almost every room was a museum of works of art and unique furniture of the most elaborate workmanship, adorned with natural and artificial curiosities from the four quarters of the globe. In his dress also Cosway was proportionably magnificent, a sort of modern Parrhasius; and all this magnificence and splendour was the fruit of his industry. His wife was equally industrious, and painted many portraits and other works of a poetic and imaginative nature, but Cosway would not allow her to paint portraits professionally. There are several prints after her works by Bartolozzi, V. Green, and others.

Cosway died in 1821, aged eighty, and his widow retired to Lodi, established a ladies' college there, and became widely known and respected. She had spent some years at Lodi previously, during the war, for the benefit of her health, and had acquired a strong attachment for the place.

(Smith, *Nollekens and his Times*; Cunningham, *Lives of the most eminent British Painters*, &c.)

COTES, FRANCIS, R.A., one of the originators of the Royal Academy of Arts in London, was born in London, in 1725, where his father was an apothecary. He was the pupil of George Knapton, and distinguished himself by his portraits in crayons, in which he was unrivalled; he was also a good painter in oil, and, in the opinion of Hogarth, a better portrait-painter than Reynolds: both painters had recourse to the same artist, Toms, for the painting of their draperies. Cotes was in great practice, and lived in the house in Cavendish Square which after his death was occupied by Romney, and is now the residence of Sir M. A. Shee. Walpole mentions a few of his best works, as a full-length of the queen of George III. holding the princess royal on her lap, engraved by W. W. Ryland; Mrs. Child, of Osterly Park; the beautiful daughter of Wilton the sculptor, afterwards the wife of Sir Robert Chambers; his own wife; O'Brien, the comedian; and *Polly Jones*, a woman of pleasure. Many of his portraits have
been engraved by Bartolozzi, Green, MacArdell, an
He died, in consequence of taking *soap-lees* for the
1770, before he had completed his 45th year: the
stance is noticed by Mary Moser, afterwards Mrs. Lloy
in a letter to Fuseli when at Rome.

(Walpole, *Anecdotes of Painting*, &c.; Edward
dotes of Painting, &c.; Smith, *Nollekens and his T*

COTMAN, JOHN SELL, an artist whose maste
ings of architectural subjects—old buildings and other
ties, have obtained for him the honourable distinctio
English Piranesi, was born at Norwich, about the ye
and educated at the free school of that city, on
which he immediately took to his pencil as his futur
sion. He first practised chiefly in water-colour pai
which he displayed a vigour and boldness very unusu
period; but though he did not entirely abandon tha
of art, he afterwards applied himself more particular
chitectural drawing and engraving—and to etch upo
views made for that purpose by himself. His first pu
of the kind was his 'Miscellaneous Etchings of Arch
Antiquities in Yorkshire,' &c., in 28 plates, folio, 18
mediately succeeded by the 'Architectural Antiq
Norfolk,' fol., 1812-1817; and he at the same time
out the 'Sepulchral Brasses in Norfolk,' 84 plates, la
1813-1816. In 1817 he went to France, where h
some time in collecting the materials for his next,
finest of all his works, the 'Architectural Antiquities
mandy,' which appeared in two volumes folio, 1820,
plates, and descriptive and historical letter-press by M
son Turner of Yarmouth, who zealously patronized hi
his residence in Norfolk. He afterwards settled
London, and for a few years before his death, wh
place some time in 1843, held the appointment of te
drawing in King's College, Somerset Place.

COTONEASTER, a genus of plants belonging
natural order Rosaceæ, and to the tribe Pomeæ.
ments of the calyx 5; the petals 5; the styles 2-5;
turbinate, its nuts adhering to the sides of the calyx,
cohering at the centre; the stamens erect, as long as
of the calyx. The species are shrubs, with
tire leaves, woolly beneath. This genus was separa
Mespilus by Lindley. There are several species.
is British, *C. vulgaris*. It has roundish ovate leaves,
at the base, flower-stalks and margins of the calyx
The petals are rose-coloured. It is a native of Europ
found in North Wales upon the cliffs at the Great
head. There are other species natives of the south
and various parts of the East Indies.

All the species are adapted for shrubberies, and
them are very commonly cultivated in Europe.
easily propagated by laying down the branches, or by
which should be placed in a sheltered situation under
glass. They may be also increased by dividing the
and by seeds.

(Lindley, *Linnean Transactions*, xiii.)

COTTAGE ARCHITECTURE. The term
has for some time past been in vogue as a particular
tion for small country residences and detached
houses, adapted to a moderate scale of living, yet with
attention to comfort and refinement. While in this
it, the name is divested of all associations with pove
convenient, inasmuch as it frees from all pretension an
and restraint. For this reason those who possess bot
houses and country mansions, have frequently their
also, as an occasional retreat. With the name, someth
has been assumed of a mode of building intended to an
—one of homely and rustic character—rejecting arch
rules, yet requiring a studious observance of approp
pression and picturesque physiognomy. The cottage
therefore considered by some as a hybrid branch of
or as hardly belonging to it at all, it being subject to
laws than mere fancy and caprice. Gwilt dismisses
summarily in his 'Encyclopædia,' merely remarking
is a nondescript sort of building, and a branch of
quiring a minimum of mind on the part of the archite
it certainly requires much more than the minimum of
of a knowledge of principles, to guide where no
can be laid down. There certainly is very little
taste either, shown in the majority of the publicati
they are not a few, which profess to give designs
turesque cottages, &c.; a proof that it requires some
tact to succeed in a species of architectural compositio
requires, if no great mechanical science, at least a

the happy accidents of light and shade, and con-
asses and lines,—matters not to be learnt me-
like the proportions of the orders, nor to be learnt
mal precepts. Not only a different, but almost an
ode of treatment from that required for what is
lar architecture,' and might be termed rhythmical
design, must here be adopted. What would be
nd defects in the latter become merits in the other,
rsâ. Overlooking this distinction, and perhaps
e at a loss when released from those conventional
hich are their support, and the observance of which
rtain respectability of design, some architects have
ed when they have condescended to this apparently
r and illegitimate branch of their art. Soane,
others, who have published books of designs for
, have chiefly manifested how little feeling they had
que quality, and how very ill they perceived or
the elements—too complex and subtle for ordinary
analysis—which constitute it. It seems to have
t that whatever deviated from ordinary rule would
ue as matter of course; accordingly there is fre-
designs of that stamp something not only dis-
rmal and frigid, but finical also, and a certain pert
which savours far more of townish vulgarity aping
an of unaffected simplicity. In endeavouring to
ity, others, again, have run into quite the con-
, have thought they could not carry irregularity
that whatever was odd, fantastical, and whimsical,
turesque likewise; whereas a mere jumble of parts
one idea pervading it, is far from either producing
ty or manifesting any imagination.

o direct instructions can be laid down, general
d hints must suffice, especially where the subject
glanced at: the mode of treatment must be re-
me degree by the actual purpose of the buildings:
's residence, or gate-keeper's lodge, the genuine
acter may be adhered to more strictly; study of
chiefly bestowed on rendering it a picturesque,
n ornamental object, though it may not happen to
ornamented one. A cottage within the vicinity of
or the purpose of a dairy or something of that sort,
admit of being more fanciful in design, and even
decorative character. In a cottage intended for
or's residence, whether a permanent or merely oc-
, the expression above all to be aimed at is that of
including comfort, and a look of homeishness as es-

To this quality no less than to picturesque effect,
of plan contributes not a little, because it indicates
convenience has been chiefly attended to, and
ersity of shape of the exterior is the result of
ot, indeed, of mere purposeless chance, but of cir-

Thus, instead of being affected, the picturesque
leasing in a class of buildings where regularity
ly insipid monotony and dull formality, grows up
ly, and is in a great measure suggested by actual
, although the degree of it which is prompted in
ance may be afterwards increased for the sake of
t. On the other hand, the necessity for breaking
regularity will suggest agreeable combinations of
for the interior, and will provide many spaces
esses, closets, lobbies, &c., that would never pre-
lves in a plan intended to secure perfect uni-
esign externally. Irregularity, however, has its
er is it essential that there should invariably be a
ree of it. In some instances it will be sufficient
up the sameness of uniformity by bringing out
ch or a bay window on one side of the centre; or
e composition into two unequal masses, slightly
eir features.

ition of a cottage style is moderateness of scale,—
s of comparatively small dimensions and low pro-
d only a single chamber-floor; or, if another be
ought to have its window in gables, or in lucarnes
. Such smallness of scale does not prevent the
from being of considerable extent, for it may very
ear to have spread out to its actual dimensions,
having been made from time to time, a process
tures of the kind readily admit of. The mere
duced by grouping together small parts, is a very
ng from greatness; and both that and stateliness
of the question for cottage architecture, whereas
, although upon a limited scale, without impro-
stateliness and dignity of character. Though a house of the latter description may not rank as a mansion calculated for the accommodation of a numerous establishment, it may contain spacious and lofty rooms, and everything both within and without may be allowed to announce the splendour of art. The cottage style, on the contrary, utterly rejects the studied pomp of art; and, in his treatment of it, the architect ought to be guided by somewhat the same principles as those which direct the landscape-gardener in the laying out grounds: like the latter, he has a certain type to keep in view, but at the same time is expected to refine upon it; for the fidelity of imitation that would give us the coarse rusticity of a real cottage, would be downright absurdity, and to be in keeping with such a residence, a dunghill in front of it might be substituted for a parterre. So far is uncouthness from being a requisite, that considerable ornateness is allowable, the degree of it being regulated by circumstances, and the character of it being in accordance with the particular architectural style professed to be followed; for various modes of domestic architecture may be employed for buildings coming under the denomination of the cottage class, although the most obvious and natural one is that derived from English houses of the fifteenth and sixteenth centuries, many of which now exhibit a degree of picturesque rudeness that did not originally belong to them, having been converted into farm-houses and smaller tenements. Parts of Elizabethan buildings also afford excellent studies; and both that and the immediately preceding or Tudor style supply strongly marked and characteristic forms and features arising entirely out of construction, such as chimneys carried up externally from the ground, and terminating in clustering shafts, which together with gables in various situations, and frequently of quaint design, serve to give great play of outline, and variety to the whole mass, whether it be seen in shadow against the sky, or relieved by a darker background of foliage behind it. In regard to colour, that of the materials should be preserved: the timber and woodwork ought to be merely stained to take off its rawness, and varnished just enough to bring out its grain, and protect the wood from the weather. At any rate, the painting ought to be of neutral hues, somewhat broken so as to avoid a uniform smooth surface; the mellowing of colour must then be left to sun and weather. In few instances perhaps ought green to be employed externally; green doors, green window-frames, and green verandas, are rarely in accordance with the principles of true taste.

COTTON, CHARLES, was born in 1630, at Beresford Hall in Staffordshire, the seat of his father, which was afterwards his own property and the chief place of his residence. He was educated at Cambridge, and travelled on the Continent, after which he married and lived principally in the country. He died at Westminster, in 1687. His name is best secured against forgetfulness by his friendship for Izaak Walton, and his co-operation in the later editions of the 'Complete Angler.' [WALTON, IZAAK, P. C.] But he was an active translator from the French, of Montaigne's 'Essays,' of historical and other prose works, and of Corneille's tragedy 'Horace;' and he published also various productions in verse, both serious and comic. His most ambitious poem of the former class is 'The Wonders of the Peak;' but neither this nor his other serious poems have kept their ground even in the favour of studious critics, while by all other readers they are completely neglected. He is more generally known as the author of 'Scarronides, or Virgil Travestie,' a burlesque imitation of three books of the Æneid. This work has by some been rated very high: but the value set on it has always been in an inverse ratio to the purity of taste possessed by its judges. Its kind of wit is as low as its tone of moral feeling. His prose imitations of Lucian, and his 'Voyage to Ireland' in verse, are much better specimens of his talents for humour. There are several incomplete collections of his works.

The translation of Montaigne has great merit. Cotton's genuine version was afterwards spoiled, or, as it is expressed in the preface to the edition of 1759, 'it was polished or rather modernized in some pages of our last edition; but in the present one (1759), it is corrected and improved throughout, besides the rectifying of many mistakes, which Mr. Cotton probably would not have been guilty of, if he had been assisted by those dictionaries published since his time, that are the best explainers of the Gascon language, which was Montaigne's mother tongue.' If this second translation has corrected mistakes, it has certainly not improved the style of Cotton's version.

COTYLE'DON, a genus of plants belonging to the natural order Crassulaceæ. It has 5 sepals shorter than the tube of the corolla; the petals cohering in a tubular 5-cleft corolla;

the stamens 10, inserted on the corolla; 5 hypogynous scales; 5 carpels. The species are succulent shrubs, mostly natives of the Cape of Good Hope.

C. Umbilicus, Navel-Wort, has the lower leaves peltate, concave, orbicular; the bracts entire; flowers pendulous. The flowers are of a greenish yellow colour, and the stem is 6-12 inches high. It is found on rocks or walls in the West of England. It is also a native of Portugal.

C. lutea has the lower leaves somewhat peltate, upper leaves crenate or toothed, the bracts toothed, flowers erect. The flowers of a bright yellow. It has been found wild in England, but is probably not a native.

Many of the species of this genus have been separated under the genus Umbilicus, the type of which is the first species named—which is called *U. erectus*. The species of Umbilicus closely resemble those of Cotyledon. In the cultivation of the species of both genera, they should be placed in pots well drained, with a soil of sandy loam or brick rubbish. They may be propagated by cuttings, which should be laid to dry for a few days after they have been cut off, before they are planted, as they are apt to rot at the wound if otherwise treated. The best situation for these plants is the shelves of a greenhouse.

(Don, *Gardener's Dictionary*; Babington, *Manual of British Botany*.)

COUNCIL, OF THE CHURCH, an assembly of prelates who meet, being duly convoked by the legitimate authority, for the purpose of defining questions of doctrine, or making regulations or canons in matters of discipline. There are various sorts of councils: 1st, General or Œcumenic councils, which are considered as a representative and legislative assembly of the whole church, and to which all bishops are summoned. A list of these councils will be given hereafter. In the early ages of the church the general councils were convoked by the Roman emperor; they have been since convoked by the pope, at least for the Western or Roman church. The authority of the general council is considered as binding on the whole church only in matters of faith, when the canon establishes a dogma which it enjoins all the faithful to believe, under pain of anathema and heresy. In matters of faith the Roman church considers the general council to be infallible; some say however only after its canons have been confirmed by the pope. All bishops have a right of attending and voting in the general council; the abbot and generals of monastic orders have also been admitted to vote in most councils by consent of the council. Priests and monks have also attended the councils as theologians and advisers, with a consultative but not a deliberative vote. In the Western church, the pope, or his legate for him, presides in the council. For a council to be legitimate, it is required that all the bishops should be called to it, whether they attend or not, except those who are declared by the church to be schismatic or heretical, and all deliberations should be free and unconstrained.

2nd, National councils, consisting of the bishops of a whole kingdom or state, which can be convoked by the respective sovereigns; but their authority is not considered universal over the whole church.

3rd, Provincial councils are convoked by the respective metropolitans, with the consent of the sovereign. A bishop may also convoke a diocesan council, with the consent of his superior. (Benedict XIV. *De Synodo Diocesana*.)

The Church of Rome reckons several councils, though not œcumenic, previous to that of Nice; the earliest of which seems to be that held at Jerusalem about the year 50 of our æra, and which was attended by the apostles Peter, John, James, Paul, and Barnabas, and which is mentioned in the xvth chapter of the Acts of the Apostles.

SERIES OF GENERAL OR ŒCUMENIC COUNCILS.

NICE, THE COUNCIL OF [P. C.], was convoked by Constantine, A.D. 325, condemned Arius, and framed the Confession of Faith, or Symbol of Nice.

Constantinople, First Council of, convoked by the Emperor Theodosius I., A.D. 382, confirmed the canons of the council of Nice, and established the dogma of the divinity of the Holy Ghost against the attacks of Macedonius. The council consisted of 150 eastern bishops who decided among other questions that the Bishop of Constantinople should take rank next to the Bishop of Rome. The canons of this council were acknowledged by Damasus, bishop of Rome, and the other western prelates.

Ephesus, Council of, convoked by Theodosius II., A.D. 431, consisted of about 200 bishops, and was attended by the
legates of Celestinus, bishop of Rome. It conde
torius. [NESTORIANS, P. C.]

Calchedon, Council of, convoked by the Empe
anus, A.D. 451, consisted of 630 bishops, and
of Leo I., bishop of Rome. It condemned th
council of Ephesus of A.D. 449, which had ap
doctrine of Eutyches and of Dioscorus concernin
natures in Jesus Christ. [EUTYCHIANS, P. C.]

Constantinople, Second Council of, convoked by
A.D. 553, condemned the tenets of Origenes, as w
doctrines known by the name of the 'three chapt
canons of this council were first disapproved, and
sanctioned, by Vigilius, bishop of Rome. [ORIGEN
VIGILIUS, P. C.]

Constantinople, Third Council of, A.D. 680, conv
Emperor Constantine Pogonatus, confirmed the ca
five previous œcumenical councils, and condemned
of the Monothelites, an offshoot of the Eutychians

Nice, Second Council of, convoked by the Emper
tine, son of Irene, A.D. 787, consisted of above 3
and was attended by the legates of Pope Adrian I
demned the Iconoclasts, and sanctioned the worship
in the churches. The authority of the above seve
is acknowledged by the Greek as well as the Latin

Constantinople, Fourth Council of, convoked by th
Basilius, A.D. 859, and attended by the legates
Adrian II., condemned the schism of Photius, an
Ignatius to the see of Constantinople. [PHOTIUS,

Lateran, First Council of, styled the Ninth C
was convoked by Pope Callixtus II., in 1123, and
only of the Western or Latin bishops; the Greek ch
ing completely separated itself from that of Rome lo
It made several canons of discipline against simon
concubinage, and the alienation of church property
the incumbents of parishes under the superintende
respective bishops, and bestowed indulgences on
took the cross for the defence of Palestine.

Lateran, Second General Council of the, convok
nocent II., A.D. 1139, condemned the antipope
and his patron Roger Count of Sicily: condemned
heresies of Peter of Bruis, and of Arnaldo of B
made several canons of discipline.

Lateran, Third Council of, convoked by Pope
III. in 1179, after his reconciliation with the Em
deric I., made many canons of discipline and moral
its last canon, after anathematizing Cathari, Pata
genses, and those who afforded them protection, it s
although the church abhors the shedding of blood,
refuse the countenance and support of the tempor
Christian princes, because the fear of corporal puni
sometimes efficacious in producing spiritual reforma
church therefore allows the faithful to take up ar
the anathematized heretics, Cotteraux, Brabançons,
who were carrying desolation everywhere, and pl
who will fight them under its own especial protecti
Cotteraux, &c., appear to have been a kind of law
zans in the pay of turbulent barons, who were mix
the sectarian feuds of the times, especially in Fran
and Saracens were forbidden by the council to pos
tian slaves.

Lateran, Fourth Council of, convoked in 1213
Innocent III., met in November, 1215, and was at
the Patriarchs of Constantinople and of Jerusalem,
nople being then in the hands of the Latins, and
400 bishops. It was opened by the pope in person.
tioned seventy canons, or decrees, which had been
the pope, especially on matters of discipline, and
tions are often quoted by canonists on questions of
benefices, the election of bishops and abbots, &c. I
auricular confession, at least once a year, on all th
who have reached the age of discretion, forbidding
fessor to reveal any part of the confession, under
deposition and confinement for life in a monastery
joined that, to every cathedral or collegiate chur
shall be appointed a teacher of grammar and other
the poor of the laity as well as of the clergy, who
taught gratis. In the metropolitan churches the
be also a professor of theology, to teach and expl
priests and other churchmen the Holy Scriptures
care of souls. The council likewise promulgated a
tion or profession of faith, in which the doctrine of
stantiation was expressly included. The council
tized all heresies contrary to any part of the said p

decreed that heretics, after being condemned by the :ch, shall be given over to the secular powers, which are ined to drive away from their territories all such heretics; if the temporal lord neglect to do so, he shall be excom- icated by the bishop; and if, within a year, he does not :e his submission, information shall be given to the pope, o will release his vassals from their oath of allegiance, and l give the lands of the refractory feudatory into the hands m orthodox feudatory, saving the rights of the superior or mount lord, provided the latter makes no obstacle to the cution of this ordinance. The Gallican theologians how- r reject this canon, as an abuse of power on the part of the ncil, or rather of the pope who had framed the canon.

(Richard, *Analyse des Conciles; Concile Quatrième de La- m.*)

Lyon, First Council of, convoked A.D. 1245 by Pope cent IV. for the extirpation of heresy and schism, for fording of assistance to the Christians of Palestine, and to judge of the charges against the Emperor Frederic whose councillor, Thaddeus of Suessa, undertook to nd his master. After listening to his defence, the coun- xcommunicated Frederic, and then the pope, in presence e council, pronounced sentence of deposition against that eror. It was not the council that assumed to depose deric; nor did Innocent IV., as Bossuet remarks, support entence by alleging the sanction of the council to it, as lleged in other decrees which he issued in the same council; pope merely says that he pronounced the sentence of de- tion in the presence of the holy council assembled. The cil also ordered a new crusade for the recovery of the y Land, and made provision for the funds required for the ose.

yon, Second Council of, convoked in 1274 by Pope Gre- X. for the object of reforming discipline and the morals e clergy, for the reunion of the Greek church, and for ssistance of the Christians of Palestine. The assembly very numerous, consisting of more than 500 bishops and inferior dignitaries of the church, besides the ambassadors any princes, especially of Michael Comnenus, Emperor onstantinople, who wrote to profess his adherence to the odox Roman Catholic faith, and to acknowledge the pri- y of the see of Rome. Thirty-eight Greek prelates sent kewise their act of adhesion.

he council made several excellent regulations concerning election of bishops, and the appointment of parish incum- s, and the administration of church property.

enne (in Dauphiny), *Council of*, convoked by Pope ent V. in 1311, condemned the order of the Templars, the pope suppressed the order and confiscated their pro- y. [TEMPLARS, P. C.] It likewise condemned the so- d Beggars, Fratricelli and other heretics, and made al regulations of discipline concerning monasteries and itals. It also promulgated a profession of faith concern- the human nature of Jesus Christ, according to the mony of St. John.

ONSTANCE, COUNCIL OF [P. C.], assembled in 1414, con- ned Huss and his disciples, deposed Pope John XXIII. two antipopes, and elected Martin V., who dissolved the ncil in 1418.

he next general council is that of *Basle*, which, on nt of its importance in the history of the church, de- es more particular notice. The council of Basle was oked by Pope Martin V. in 1430, in conformity to a e of the council of Constance, session 39, which had ided that a new general council should assemble within years. Pope Martin appointed Cardinal Julian Cesarini, gate in Germany, to preside over the council. Soon after tin died (February, 1431), and his successor, Eugenius confirmed Cesarini as president of the council. The ssion, or meeting, took place in December, 1431, when inal Julian opened the council by an eloquent speech, in h he exhibited the evils of the church resulting chiefly the relaxation of its discipline; and, having exhorted fathers and the clergy in general to give the example of arity and piety to their flocks, he stated the two great ts of the present council to be, one, the reunion of the tern and Western churches, and the other, an effectual m of the church in general in all its members. The cil then appointed its various deputations, or committees, amine at length the matters laid before each of them and e their reports thereon, which were to be taken into con- ation by the whole council assembled in session, and there to the votes.

The second session of the council took place in February, 1432. In the interval between the first and second sessions it became known at Basle that Pope Eugenius intended to dissolve the council as likely to prove troublesome to him if allowed to sit much longer, and that he had actually framed the bull for its dissolution. In consequence of this, the council issued a decree declaring that it held its power immediately from Jesus Christ, the Head of the Church; and that every person, even the pope, was bound to obey its decisions in matters of faith, as well as for the extirpation of schism, and likewise for the reformation of the church. Meantime the pope had issued his bull of dissolution. Cardinal Julian then wrote two forcible letters to Eugenius, maintaining the rights of the council, and asserting that according to the canons of the council of Constance, by which he himself, Eugenius, held the papal dignity, as successor to Martin V., who had been elected by that council after it had deposed Pope John XXIII. and the other claimants to the papal crown, the pope had no power of dissolving a general council once lawfully convoked and assembled, until that council had performed the task for which it had been convoked. The fathers sent likewise a synodal answer, of the same meaning, to the papal bull, in which they asserted that the pope, although the ministerial head of the church, was not exalted above the whole mystical body of the church, as that mystical body, even exclusively of the pope, cannot err in matters of faith, being under the inspiration of the Holy Ghost; whilst the pope, although the head of the church, might err, as experience showed. The body of the church represented in the general council had deposed popes who had erred in matters of faith, but no pope had ever assumed to condemn or excommunicate the whole body of the church.

In the third session, April, 1432, the council summoned Eugenius to revoke the bull of dissolution; and to attend the council in person in three months' time, or to send persons with full powers to represent him.

In the fourth session, June, same year, a sauf conduit was given to the Bohemian deputies who proposed to appear before the council to arrange matters for the religious peace of their country. Pope Eugenius being reported ill at the time, the council decreed that in case of his death, the council should not proceed to the election of his successor any where else but in the body of the council. Any other election was declared beforehand to be null and void.

In the fifth session, in August of the same year, three judges were appointed to examine questions of faith. The Bishop of Taranto, sent by Eugenius as his legatee, delivered a high flown speech, exalting the papal authority as the only fit judge of the place and time for the holding of councils, and he stated that as the pope could not then leave Italy, he offered to remove the assembly to any town in the Papal states which the fathers might fix upon. The council replied that to dissolve or remove a council lawfully assembled would be to renew schism in the church, and would be contrary to charity and the inspiration of the Holy Ghost.

In the sixth session, September, the council decreed that as Pope Eugenius did not make his appearance, he should be declared 'contumax' after being cited three times at the gate of the church.

In the 7th session, November, the decree of the fourth session was confirmed, forbidding the cardinals to hold a conclave, in case of the pope's demise, without permission from the council.

In the eighth session, December, a further delay of two months was granted to Eugenius to revoke his bull of dissolution, after which the council would proceed canonically against him. It was also decreed that any other council convoked elsewhere, would be a cabal and a schism, as there could not be more than one general council assembled at a time. The Bohemian deputies arrived at Basle in January, 1433. They laid before the council the demands of their constituents, namely the sacrament 'sub utraque' for the laity; that the clergy should have no power over temporal things, and that the word of God should be preached fairly and freely. The council upon this appointed deputies to repair to Bohemia to confer upon these matters on the spot.

In the ninth session, January, 1433, the Emperor Sigismund having by letters patent taken the council and all its members under his especial protection, the council on its part declared that it would protect Sigismund from any arbitrary act of the pope against him.

Tenth session, February, 1433. The council was proceeding to declare Eugenius 'contumax,' but the emperor and

Cardinal Julian interposed, and offered to write to the pope, upon which the council adjourned its proceedings.

Eleventh session, April same year, it was decreed that if the pope henceforth neglected to assemble a general council every ten years, as ordained in the ninth session of the council of Constance, the right of convocation should devolve upon the bishops without the pope's permission. The fathers likewise confirmed the decree of the council of Constance, by which a general council, once assembled, could not be adjourned, transferred or prorogued by the pope without the consent of two-thirds of the members. Meantime Eugenius had sent two legates to the council, with full powers; but the council would not admit them, as the pope had not revoked his bull of dissolution.

Twelfth session, July. The council summoned Pope Eugenius to revoke within two months' time his declaration of transferring the council to another place. It also passed several regulations of discipline, against simony, &c. Eugenius on his part abrogated by a bull the decrees of the council against himself, and declared the council to have been in error when it asserted its superiority above the pope.

Thirteenth session, September. At the request of the Duke of Bavaria another month was allowed to Eugenius before the fathers passed judgment upon him.

Fourteenth session, November. The Emperor Sigismund was present at the council. Three months were granted to Eugenius to revoke all his acts against the council.

Fifteenth session. Eugenius, having at length listened to the mediation of France, Burgundy, and other powers, revoked the bulls which he had launched against the council, and issued another bull according to the form sent to him by that assembly, in which he declared that although he had dissolved the council of Basle lawfully assembled, yet, in order to avoid dissension, he now declared that the council had been lawfully continued since its first beginning, and that he approved of all its decisions, and declared the bull of dissolution to be null and void. He then appointed four cardinals to preside in the council together with Cardinal Julian.

Sixteenth session, February, 1434. The letters of Eugenius were read in full council and presence of the Emperor Sigismund. The papal legates were introduced and incorporated with the council.

Seventeenth session, April. The legates were made to swear to support the dignity of the council, and to observe its decrees as well as those of the Council of Constance, and that their authority should be dependent on that of the council and not coactive with or compulsory upon the Council.

Eighteenth session, June. The council confirmed the decrees of the fourth and fifth sessions of the Council of Constance. John, Patriarch of Antioch, read a thesis in favour of the superiority of the general council above the pope.

Nineteenth session, September. Conferences with the ambassadors of John Palæologus, emperor of Constantinople, concerning the projected union of the Eastern and Western churches. Legates appointed by the council to proceed to Constantinople. The council decreed that in every university there shall be professors of Hebrew, Arabic, Greek, and Chaldæan.

Twentieth session, January, 1435. Decrees of reform of church discipline, penalties against concubinarian priests, &c.

Twenty-first session, June. Decree against the 'annates,' or first fruits, and other payments and fees exacted by the court of Rome. Three years of undisturbed possession of a benefice, obtained by legitimate title, to be considered as affording a prescriptive title to the possessor. Several decrees on public worship and other matters. Pope Eugenius remonstrated strongly against the suppression of the 'annates,' urging that the council ought at least to make compensation for the support of the Holy See. Cardinal Julian's reply to the pope's remonstrances.

Twenty-second session, October. Condemnation of a book written by an Austin friar, who had ascribed some attributes to the human nature of Christ which properly belong to his divine nature.

Twenty-third session, March, 1436. Decrees concerning the free election of the pope, his profession of faith, the number of cardinals reduced to twenty-four, &c. All reserved benefices, mandates, and other grants applied by the popes to their own profit, declared null and void.

Twenty-fourth session, April. The legates of Eugenius urged the fathers to fix upon a town where to assemble a new council, in order to meet the Eastern emperor and his retinue and prelates, for the purpose of effecting the reconciliation of the two churches. A congregation was held in consequer
was attended by 357 prelates, two-thirds of whom
the city of Basle, if the Greeks should agree to it. a
they proposed Avignon or some town of Savoy. A
was sent to Eugenius to entreat him to crown the
the present council by the reunion of the Eastern
Western churches, and inviting him to come in pers
pedite the necessary bulls. Eugenius however, sup
minority in the council, was for holding a new coun
town of Italy, and many months elapsed in fruitles
tions upon this subject.

Twenty-fifth session, May, 1437. The counci
that the œcumenic council for the union of the two
should sit either at Basle or at Avignon. Most of th
did not wish to go to Italy, where they would have
much in the power of the pope. A division then o
the assembly. A minority joined the Papal legates, a
decree by which they assumed the authority and name
cil, and transferred the council to Ferrara. Eugenius
to issue a bull which confirmed this decision, and im
caused a squadron of galleys to be equipped at Veni
ceed to Constantinople with three Papal legates, for
pose of bringing the emperor and the Eastern
Ferrara. The council of Basle, that is to say the
of that assembly, which had kept together, sent like
leys for a similar purpose, but they were too late, an
peror repaired to Venice with the Papal legates on
Venetian galleys. Cardinal Julian, who was still
proposed to the council to send a deputation to Ven
ceive the emperor on his landing, and, by explaini
how matters stood, to endeavour to bring him to Ba
fathers however hesitated and lost time. Up to th
the council of Basle is considered by most Catholic t
to have been truly œcumenic and legitimate, as Pope
had solemnly acknowledged it as such since Novem
and had since acted in union with it by means of h
Some ultramontane divines however, and Holsteni
the rest, controvert the authority of the council
Pope Nicholas V. however, who succeeded Eugen
bull beginning 'Ut pacis,' dated Spoleto, July. 14
of the council of Basle with respect as a council,
a conciliabulum, and Eugenius himself in his lett
legates in Germany, dated Rome, August, 1446, i
the Annals of Raynaldus, speaks of the general c
Constance and Basle, as being by him acknowl
venerated, without prejudice however to the right
eminence of the Holy See.

The council of Basle, in its Twenty-sixth session, J
again summoned Eugenius to appear before it, and
answered by a bull for the dissolution of the council
ing the meeting of a new council, to which he i
Christian prelates, and forbidding under heavy can
nalties the making of any more synodal acts at Basle
period of thirty days which were to be employed in w
the negotiations with the Bohemian deputies. Ki
VII. of France forbade his bishops to repair to Fer

In their 27th session, September, the fathers a
clared null and void the creation of two cardinal
made by Eugenius.

In the 28th session, October, the period assigned
nius for his appearance being expired, the fathers
him 'contumax' and resolved to proceed canonical
him. Eugenius at the same time issued a bull, t
the Council to Ferrara. In his letters to his legat
many he speaks of the Council of Basle as a legi
sembly until the order for transferring it to Ferrara.

In the 29th session, October, the fathers rejecte
of transfer to Ferrara, and assigned their reasons for

In January, 1438, one Cardinal Nicholas, Eug
gate, opened the new Council at Ferrara. Cardinal Ju
still remained at Basle, quitted that town with four
lates, and joined the Council of Ferrara. The C
Basle was declared henceforth null, and all its future
declared void. Several theologians date from this
termination of the legality of the Council of Basle.
sembly however went on holding its sessions for
longer, and a schism in the church was the res
Council of Basle deposed Eugenius in 1439, an
Amadeus VIII. of Savoy, by the name of Felix V
measures however were discountenanced by the great
of the Catholic world; France, England, and Gern
approved of them. Most of the bishops withdrew fr
and their places were filled up by archdeacons, fr

and doctors, and other churchmen not of episcopal rank. that period it is impossible to consider the Council of any longer as œcumenic. The last session of this self- Council of Basle was held in May, 1443, when it ed that within three years a council, or rather a conti- on of the council, should be held at Lyon. It however ultimately at Lausanne, in 1449, when Felix having ab- ed, the remaining fathers of the Council of Basle made peace with Nicholas V.

the collection of the Acts of General Councils, handsomely ished in Greek and Latin, by order of Pope Paul V., ciliorum generalium Ecclesiæ Catholicæ,' 4 vols. folio, e, 1628, the Council of Basle is altogether omitted, but of Constance is inserted. The following writers have ted especially of the Council of Basle:—Æneas Sylvius olomini (afterwards Pope Pius V.), who was for a time tary to the council, in his 'Opera,' which also contain the celebrated epistles of Cardinal Julian to Pope Eugenius, taining the paramount authority of the council; le Père adre, a Dominican, 'Dissertationes de Conciliis Senensi siliensi,' in the eighth volume of his 'Historia Ecclesias- Paris, 1714, and Venice, 1749; Richer, 'Responsio Sy- is data Basiliæ, Oratoribus D. Eugenii P. P. IV., in Con- tione Generali III., Non. Septemb., 1432: De Aucto- cujuslibet Concilii generalis supra Papam et quoslibet s, pars præcipua, et in eam Commentarius,' Coloniæ, ; Lenfant, 'Histoire de la Guerre des Hussites et du le de Basle,' which refers chiefly to the transactions of Bohemian schismatics and their negotiations with the il of Basle, on particular points of rite and discipline; rd, 'Analyse des Conciles.'

rara, Council of, was attended by Pope Eugenius, the ror John Manuel Palæologus, the Patriarch of Con- ople, Mark, archbishop of Ephesus, and about twenty Eastern bishops. The discussions between them and tin prelates turned first upon the dogma of the proceed- the Holy Ghost and the word 'filioque' said to have dded by the Latins.

1439 the council was transferred to Florence, and the sions were continued. The two parties effected a re- ation, excepting Mark of Ephesus, upon the dogma of Holy Ghost, that of purgatory, and the supremacy of the which the Greeks acknowledged, 'saving the privileges ghts of the patriarchs of the East.' The act of union gned by the vicars of the patriarchs of Alexandria, An- and Jerusalem, and by several metropolitans, but it was after disavowed by the great body of the Eastern church. ek Church, P. C.] The Eastern prelates, about thirty mber, left Florence in August, 1439, to return to their ry. After their departure, Pope Eugenius continued the il, although it could no longer be called general, the re- d Eastern church being no longer represented in it. fathers of Basle, who had deposed Eugenius, were de- d heretical, as well as Felix V., who was declared to schismatic antipope. After several other decrees the cil of Florence was closed in April, 1442. The French other divines do not recognise the authority of the Council lorence, which however is fully acknowledged at Rome. ame may be said of the following:—

teran, the Fifth Council of, was convoked by Pope Julius in 1512, to oppose the acts of the pretended Council of when a certain number of prelates hostile to Julius had as- led under the influence of the king of France, then at nce with the pope. After declaring all the acts of Pisa nd void, and summoning the French prelates to appear nce, Pope Julius died in February, 1513, but his succes- eo X., continued the council, and Louis XII., giving up Conciliabulum' of Pisa, sent in his adhesion to the cil of the Lateran. The French prelates however did ttend, under various excuses. The council continued as- led till March, 1517. It chiefly concerned itself with rs of discipline. Among others, it established a general siastical censorship on all printed books, under pain of munication. [Censorship of the Press, P. C. S.] It rmed the concordat made at Bologna between Pope Leo Francis I., concerning the sees and benefices of France, annulled the previous pragmatic sanction promulgated by g Charles VII., conformably to the decrees of the coun- of Constance and Basle. The concordat took away from chapters the right of electing to vacant sees, and gave the ination to the king, subject to the papal sanction and ation.

rent, the Council of, is the last œcumenic council of the Latin church, and is acknowledged as such by the Roman Catholic world, although some of its decrees in matters of discipline are not sanctioned by the laws of many states. [Trent, Council of, P. C.]

The principal collections of the acts of the councils are: Labbé and Cossart, 'Sacrorum Conciliorum nova et amplissima Collectio,' with additions by Coleti and Mansi, 31 vols. fol., Florence and Venice, 1759-98; 'Concilia generalia Ecclesiæ Catholicæ Pauli V. Pont. Max. auctoritate edita,' 4 vols. fol., Rome, 1628: 'Concilia Generalia,' edita a T. Merlino, 2 vols. fol., Cologne, 1530; 'Concilia Omnia, tam generalia quam particularia,' a Petro Crabbe, 2 vols. fol., Cologne, 1538-40; 'Collectio Regia maxima Conciliorum, seu Acta Conciliorum et Epistolæ Decretales, ac Constitutiones Summorum Pontificum ab anno Christi 34 ad 1714, studio Joh. Harduini Soc. Jesu; cum novis indicibus,' 12 vols. fol., Paris, 1714-15.

There are also collections of national councils:—'Collectio Conciliorum Hispaniæ, diligentia Garsiæ Loaisa elaborata,' fol., Madrid, 1593; 'Concilia Magnæ Britanniæ et Hiberniæ a Synodo Verolamiensi, A.D. 446 ad Londinense A.D. 1717, a D. Wilkins collecta,' 4 vols. fol., 1737; 'Sacra Concilia Ecclesiæ Romano—Catholicæ in Regno Hungariæ celebrata, ab anno 1016 ad 1734,' fol., Vienna, 1742; 'Concilia antiqua Galliæ, cum Epistolis Pontificum, Principum Constitutionibus, et aliis Gallicanæ rei Ecclesiasticæ monimentis, Opera et Studio T. Sirmondi,' 3 vols. fol., Paris, 1629; 'Collectio maxima Conciliorum omnium Hispaniæ et novi Orbis, cura et studio Jos. Saenz de Aguirre, editio altera novis additionibus aucta a Jos. Catalano, cum indicibus,' 6 vols. fol., Rome, 1753; 'Conciles de Toulouse, Béziers, et Narbonne, ensemble les ordonnances du Comte Raimond contre les Albigeois, par Arnaud Sorbin, D.D.,' 8vo., Paris, 1569; 'Atti dell' assemblea degli Arcivescovi e Vescovi della Toscana tenuta in Firenze, l'anno 1787,' 4to., Firenze, 1787; 'Atti e decreti del Concilio Diocesano di Pistoja dell' anno 1786,' 4to. Firenze, 1788; 'Salmon, Traité de l'etude des Conciles et de leurs Collections,' Paris, 1724.

Some of the old Spanish councils are very important, such as the Council of Iliberis, A.D. 303, which concerned itself chiefly with the morals of the faithful, exposed as they were to the bad example of their heathen countrymen. Its canons, to the number of eighty, have come down to us, which is not the case with most of the previous councils. Several of the councils of Toledo are also very important for the elucidation of church history and controversy, especially on questions of discipline.

The Greek or Eastern Church, since its separation from Rome, has held its own general councils or synods under the presidency of the œcumenic patriarchs of Constantinople. [Greek Church, P. C.; Russian Church, P. C.]

The Protestant and Reformed Churches have also held their councils or synods, such as Dort, Synod of, P. C. The Synod of Embden, in 1571, and that of Sandomir, for the Protestant churches of Poland; the synods of the Scottish church, and the convocations of the church of England, are also a sort of national councils; but the Protestants in general do not admit the divine inspiration and consequent infallibility of the councils, whether general or national, though they acknowledge the doctrines propounded by the first two œcumenic councils of Nice and Constantinople.

COUNT. [Declaration, P. C.; Pleading, P. C.]

COUNTERPART. [Deed, P. C.]

COUNTERPOISE is, generally, a mass of brass or iron so disposed as to keep a part of some instrument or machine in equilibrio.

The instruments employed in practical astronomy are generally mounted so that their centres of gravity are supported, in which case they require no counterpoise: but a reflecting circle, for example, when placed in any position except one which is horizontal, has its centre of gravity on one side of the pillar which supports it; and a mass of brass, so connected with the axis of the circle as to be always on the side of the pillar which is opposite the latter, serves the purpose of keeping the instrument steady.

A transit instrument, or a mural circle of considerable magnitude and weight, whose pivots would press heavily on their supports, is sometimes provided with counterpoises, one for each point which is to be relieved: this is applied at one end of a lever which is supported by the pillar or stand of the instrument, the other end being connected, near the pivot, with the axle; and thus the pressure is diminished or wholly removed.

A bridge which is capable of being turned on horizontal joints at one of its extremities [DRAWBRIDGE, P. C.] usually has its weight relieved, or almost wholly removed, by a counterpoise, so that the machinery employed to raise it has little except the resistance arising from friction to overcome. The counterpoise is at one extremity of a chain, which passes over a pulley at the top of a pillar, and is attached at the other extremity to some part of the bridge.

Now, since a drawbridge, in being raised or lowered, exerts on the suspending chains a strain which increases as the bridge declines more from a vertical position, it is necessary, in order that this strain may be always in equilibrio with the constant weight serving as a counterpoise, that the latter should move on a surface whose figure is determined consistently with that condition. The rules for the resolution of forces give expressions for the strains to which the two parts of the chain are subject in the directions of their lengths; and, making these equal to one another, there is obtained an equation which may be shown to be that of an epitrochoid: such, consequently, is the figure which should be given to the surface on which the counterpoise is to slide. It should be observed that, in the investigation, the effective weight of the drawbridge is not its absolute weight (acting at the centre of gravity); but is equal to this latter weight diminished in the inverse ratio of the distances of the fulcrum, or joint, from the centre of gravity and from the point at which the chain is attached to the bridge, generally the opposite extremity of the latter.

If the pulley over which the chain passes is close to the elevated extremity of the bridge when the latter is in a vertical position, the length of the chain will, of course, be equal to the diagonal of a square of which the length of the bridge is one side: then, a circle whose centre corresponds to the joint of the drawbridge, and whose radius is the whole length of the chain, being supposed to revolve on the circumference of a fixed circle of equal radius; a point supposed to be on the produced radius of the revolving circle, or epicycle, at a distance from its centre equal to the difference between twice the length of the radius, or chain, and the length of the bridge will, by revolving with the epicycle, describe the required curve.

The great telescope recently executed by Lord Rosse, at Parsonstown, Ireland, turns upon a joint at its lower extremity; and, being intended to decline from a vertical position both towards the north and the south, it is provided with two counterpoises, in order to facilitate its elevation or depression. One of these weights is on a chain which is attached, at one extremity, to a point near the object end of the telescope, and, at the other, to a fixed point at the top of the wall; this point being so situated that, in elevating the telescope, the weight descends, and describes, by its gravity, a circular arc coinciding nearly with the proper epitrochoid The other weight is at the end of a lever projecting horizontally, from the lower extremity of the telescope, when the latter is in a vertical position; and then, consequently, it acts with the greatest power: its action diminishes, by the lever being elevated or depressed, as the telescope declines from the vertical towards the north or south.

COUNTY COURT. [COURTS, P. C.]

COUNTY RATE. County rates are taxes levied for the purpose of defraying the expenses to which counties are liable. They are levied either under the authority of acts of parliament, or on the principle that as duties are imposed upon a county there must be a power to raise the money for the costs incurred in the performance of such duties.

The antient purposes of the county rate 'were to provide for the maintenance of the county courts, for the expenses incidental to the county police, and the civil and military government of the county; for the payment of common judicial fines; for the maintenance of places of defence (sometimes however provided by a separate tax common to counties and to other districts, called *burgbote*), prisons, gaols, bridges (when these were not provided for by a separate tax common to counties and to other districts, called *brukbote*), and occasionally high roads, rivers, and watercourses, and for the payment of the wages of the knights of the shire. Additions to these purposes, some occasional and some permanent, were made from time to time by statutes. The king's aids, taxes, and subsidies were usually first imposed on the county, and collected as if they had been county taxes. But the first statute defining any of its present purposes (though now repealed as to the mode it prescribes for imposing the tax) was passed in the 22nd Hen. VIII. From that time up to the
present new purposes have constantly been adde
and distinct rates were constantly created for purp
paratively little importance, and to raise sums of
insignificant in amount.' (*Report on Local Taxa*
Poor Law Commissioners.)

The assessment and collection of separate coun
not only very inconvenient and troublesome, but
that the charge of collection and assessment fre
ceeded the sum rated. For remedying this evil t
II. c. 29, was passed, whereby justices of the peac
or quarter sessions were enabled to make a gen
answer the purpose of the distinct rates previous
under various acts of parliament for the purposes
gaols, prisons, and houses of correction, such rate to
upon every town, parish, and place within the co
collected by the churchwardens and overseers, alo
poor rates of every parish, and paid over to the hig
of hundreds, by them to treasurers appointed by t
and again by them to whomsoever the justices sho
The county rate for lunatic asylums is however,
a special rate, and so is likewise the county rate for
assize-courts, session-houses, judges' lodgings, &c
provisions of the statutes under which these rates
are disregarded, and the justices pay the expenses
general county rate. This is the case also with t
the county and district police force, where such fo
blished, though it is directed to be a special rate.
some other special rates which are required to
rates, one of which is the rate for reimbursing to o
costs incurred in the burial of dead human bodie
the shore of the sea. The contributions of a who
this rate would perhaps not amount to a farthing,
pense is of course defrayed out of the general coun

In places where there is no poor's rate the coun
directed by 12 Geo. II. c. 29, to be levied by the
stable or other peace officer of the place in the sa
as poor rates are levied, and paid over by him to th
stable of the hundred. The counties of York, D
ham, Lancaster, Chester, Westmoreland, Cumb
Northumberland, were excepted from the compulso
that the county rate should be levied along with
rate, and it was left discretionary with the justic
counties at quarter-sessions to direct the county
levied either by the churchwardens and overseers
the poor rate, or by the petty constable by an asse
the manner of the poor rate. The rates so lev
plicable to the repair of bridges, gaols, prisons, o
correction, on presentment made by the grand
assizes or quarter-sessions of their wanting repara
act gave to the churchwardens and overseers a righ
against the rate on any particular parish to the jus
next sessions. It also contained provisions enablin
tices to contract for repairs, to oblige collectors
&c. It was not the object of this act to impo
rates, nor to vary the obligation to pay, but merely
the collection of the amounts previously leviable;
contained an exception of places not theretofore li
payment of all or any of the county rates referred t
and also a provision that the rate should be assess
parish or place in such proportions as any of the r
former acts therein referred to had been usually ass
this last provision is now to be interpreted with r
the next-mentioned act as applying only to the fair
proportionable rates.

By the 55 Geo. III. c. 51, further improvem
made in the assessments to county rates. The
counties at quarter-sessions were by it empowered
fair and equal county rate when circumstances r
all the purposes to which the county stock or rate
should thereafter be made liable by law, extending to
the county except liberties or franchises having a
extensive jurisdiction. The act contained numerou
giving powers for enforcing payment of the rate;
taining the value of property for the purpose of
for regulating the right of appeal given by the f
extending the provisions of the former act to that act
counties where the rates had been regulated by l
make use of that act; extending the provisions o
places having commissions of the peace within them

By the 56 Geo. III. c. 49, extra parochial and ot
though not rateable to the relief of the poor, were
ject to county rates, and certain powers were giv
ascertainment of boundaries between counties, ri

laces of separate jurisdiction, for the purpose of l levying county rates.

Geo. III. c. 94, the provisions contained in the . c. 49, as to appeals, were repealed, and other stablished in that respect; and it was provided there were no high constables, the constables of place might levy the rates on the warrant of the

o. III. c. 70, all such parts of former statutes as t rewards should be paid out of the public revenue s upon conviction for various crimes, were repealed, acted that in future the county rates were to be h the allowances to prosecutors in such prosecu- ubsequent statutes the costs in the prosecution of emeanours are paid out of the county rates. By c. 64, the principle of compensation to witnesses ors at the expense of the county was carried into extensively. In 1836 however the government that one-half of the expense of prosecutions and ace of prisoners should be defrayed out of the ie.

Geo. IV. c. 85, the powers of former acts were places where there were no separate church- where no separate or distinct poor-rate has been y place extending into two or more counties, her divisions; justices were empowered to appoint x and assess the county rate in extra-parochial no poor-rate exists, and certain regulations were stress for rates.

& 5 Wm. IV. c. 48, all business relating to the d application of county rate is to be transacted in eld upon due notice.

& 6 Wm. IV. c. 76, § 112, after a grant of a of quarter-sessions has been made to any borough, f the county in which such borough is situate are ny property therein to any county rate thereafter ut (§ 113) such boroughs are to bear the expenses ns at the assizes.

Vict. c. 33, high constables are relieved from the ting the county rate and paying it to the county d these functions are to be undertaken by the uardians.

al acts have been passed from time to time for e county rates in particular counties. On this rn's 'Justice of Peace,' 29th edit., *County Rate*, ifferent purposes for which county rates may be merated at length.

diture of county rates in England and Wales in 2 was as follows :—

	1792. £.	1832. £.	Inc. per Cent.
. . . .	42,237	74,501	76
es of Correction, &c.	92,319	177,245	92
laintenance, &c. .	45,785	127,297	178
. . . .	16,807	28,723	70
s . . .	34,218	157,119	359
and Militia . .	16,976	2,116	
. . . .	659	26,688	4338
. . . .	8,990	31,103	248
. . . .	8,153	15,254	87
. . . .	16,315	51,401	215
. . . .	17,456	32,931	88
s, Printing, &c. .	15,890	59,061	
	315,805	783,441	

t disbursed in 1834 under the different heads of or which provision is made by the county rates s :—

	£.
ilding and Repairs, &c. . .	72,532
es of Correction, &c., and Maintaining ers, &c.	222,787
and Courts of Justice, Building, Re- , &c.	13,951
lums	12,371
. . . . . .	131,416
e Peace	31,880
of Prisoners before Trial . .	31,030
of Transports	10,370
pprehending and Conveying . .	7,621
High and Special . . .	14,007
. . . .	15,648
ent of Principal and Interest . .	78,022
s	52,112
	693,747

The expenditure in the following years was as under :—

	£.		£.
1835 .	705,711	1840 .	855,552
1836 .	699,845	1841 .	1,026,035
1837 .	604,203	1842 .	1,230,718
1838 .	681,842	1843 .	1,295,615
1839 .	741,407		

In the last three years the county police expenditure, which in 1843 amounted to 243,738*l.*, is included.

From 1830 to 1838 the proportion of five heads of expenditure was 69 per cent. of the total expenditure :—Bridges, 9·3 per cent.; Gaols, 9·7; Prisoners' Maintenance, 25·8; Prosecutions, 19·9; Constables and Vagrants, 4·3 per cent.

The county rate is levied on the same description of property as the poor's rate, that is, on lands, houses, tithes impropriate, propriations of tithes, coal-mines, and saleable underwoods: the term 'lands' includes improvements of lands, by roads, bridges, docks, canals, and other works and erections not included under the term 'houses.' Under 'houses' are comprehended all permanent erections for the shelter of man, beast, or property. Mines, other than coal-mines, are exempted, and the exemption extends to limestone and other stone quarries, or to other matter that is obtained by quarrying. The county rate is to be assessed upon parishes 'rateably and equally according to the full and fair annual value of the messuages, lands, tenements, and hereditaments, liable, or which might be liable, to be rated to the relief of the poor.' The sum assessed in 1833 was about 8¾ per cent. (or rather more than one-twelfth) of the levy for the poor, out of which fund it is paid, and in 1843 the proportion was between one-sixth and one-seventh. About five-eighths of the assessment is paid by land, and three-eighths by houses, mills, manors, canals, &c.

The act 55 Geo. III. c. 51, already mentioned, has not been found very successful in correcting unfair valuations, as the overseers on whom the re-valuation depends have an interest as owners or occupiers in a low rateable value. 'In some counties the contribution to the Land Tax serves as a scale for the proportionate contribution. In these cases the proportion has been unchanged since the year 1792, notwithstanding the subsequent alterations in the value of property In other counties the valuation to the Property Tax made in the years 1814-1815 determines the scale of contribution. In other counties some ancient scale, of which the origin is unknown to the respective clerks of the peace, determines the proportion. In other counties the nominal valuation to poor's rate, uncorrected by the application of the powers of 55 Geo. III. c. 51, and made in some counties in or very early after the year 1739, and in other counties at various periods between that date and the present time, serves as the basis of the contribution to the county rate. All these various practices are alike complained of as unequal in the counties in which they are adopted.' (*Report on Local Taxation.*) In the session of 1845 a bill was brought in to amend the law relating to the assessing, levying, and collecting of county rates. It proposed that the justices at general or quarter sessions should appoint a committee to consist of not more than eleven nor less than five justices, whose duty it should be to prepare a fair and equal county rate, with power to alter and amend it from time to time as circumstances might require. This bill has not yet passed (July, 1845).

The proportion in the pound to the county rate valuation in England and Wales and for several of the counties is as follows :—

England, 3¼*d.*; Wales, 3½*d.*; Northumberland, 1½*d.*; Bedford, 12½*d.*; Westmoreland, 2½*d.*; Middlesex, 3½*d.*; Lancaster, 1½*d.*; Anglesey, 24*d.*; Pembroke, 1*d.*

COUPLING, in machinery, is, in a limited sense, the name given to various contrivances for effecting the longitudinal connection of shafts; though, in a more general sense it may be extended to embrace the arrangements by which the parts of a machine may be connected or disconnected at pleasure, or by which a machine may be disengaged from, or re-engaged with, a revolving wheel or shaft, through which it receives motion from a steam-engine, water-wheel, or other prime mover.

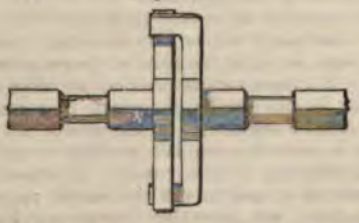
When it is required to communicate motion to a considerable distance from the source of power, as in the distribution of power to the various apartments of a cotton-mill, by gearing such as that represented under WHEELS, P. C., p. 314, it is frequently necessary to construct the long shafts by which the motion is distributed in several pieces, not only owing to the impossibility of making them accurately of the required length, but also because, if they were so made, their expansion and contraction would occasion much inconvenience. It is further desirable, in many cases, to have the option of detaching one portion of a shaft from the moving power without stopping the adjacent portion.

In such cases each distinct shaft, or portion of shaft, may be perfectly supported by bearings of its own, near each end; or, under certain circumstances, the coupling may be so constructed as to render one of the bearings unnecessary.

The simplest mode of connecting shafts which are supported by bearings near each end, is to make that portion of each shaft which projects beyond the bearing of a square shape, and to unite the adjacent ends by means of a *coupling-box*, which may be described as a square collar fitting the ends of the shafts, and capable of sliding along them in such a way that it will either embrace the ends of *both* shafts, in which case they must turn together like one piece, or that, when it is required to disconnect them, it may be slid fully on to *one* of the shafts, leaving the other entirely free. Holes are provided in both the coupling-box and the shaft, by which a pin may be inserted to hold the coupling-box in whichever position it may be required to retain. Sometimes, instead of the coupling-box being in the form of a sliding box or collar, it is formed in two halves, which may be separated at pleasure, and secured, when put together, by bolts or keys. On account of the greater facility of making them perfectly true, round couplings and coupling-boxes are occasionally used; but as their efficiency in transmitting power depends wholly upon the connecting pins, of which there should be two, passing completely through the shaft at right angles with each other, they are not so strong as square couplings.

Couplings are often effected without coupling-boxes, by the use of what are termed *clutches* or *glands*, in which projections of various forms from arms or discs attached to the ends of the shafts, are employed to lock them together, in some cases only while the machinery is in motion; while, by the removal of one of the engaging members, by sliding it back upon the shaft, the connection may be broken at pleasure. Such contrivances admit of infinite variety, and may be made to disengage themselves whenever the moving power ceases, by fixing one of the engaging members upon a pivot in such a manner that, when the pressure upon it is relaxed, it falls out of the way. This is especially the case with such clutches as act on the principle of the ratchet and click. *Fig.* 1 represents a clutch with projecting arms, which engage with each other by mere contact, and will turn in either direction. As the engaging members of this clutch are not attached to each other, it affords scope for expansion and contraction without occasioning the straining and injury which might be occasioned by a more rigid connection, and it also obviates the difficulty of throwing all the machinery into motion at the same moment, since one shaft may have to turn nearly half round before it has to impel the adjoining one. Sometimes however a similar coupling is so constructed that the connection is made by pins passing through the two arms. In some couplings the arms or glands are single, so that the connection may be compared to a common crank, instead of being double, and forming a double crank, as in *Fig.* 1; and, when it is desired to prevent the machinery from turning the wrong way, the arms may be jointed with a kind of hinge-joint, similar to that of a common two-foot rule, which will cause the bar to be quite stiff to resist a strain in one direction, although, if the motion be reversed, the joint will give way, and the connection will be broken.

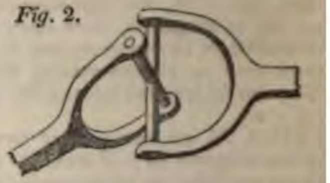
Fig. 1.



When each length of shaft has only one bearing, the coupling must be of such a construction as not merely to compel one shaft to turn with the other, but also to cause the supported end of one shaft to sustain, by a scarfed or mortice and tenon joint, or by some similar contrivance, the unsupported *end of the adjoining* shaft.

Fig. 2 represents one of various forms of th
contrivance known as Hooke's universal joint,

Fig. 2.



by which shafts which do not lie in a right lin
other, or which are liable to change their relative
this respect, may be made to turn each other.
be used as a substitute either for an ordinary cou
bevil gear, this joint or connection will accompli
ther of those contrivances can do. As an illustr
circumstances under which such a coupling may b
we may allude to a scheme patented in 1825, by
for propelling railway carriages on steep inclinati
municating the rotatory motion generated in a loc
gine to all the wheels of every carriage in the tr
the medium of a system of rods thus connected,
quently capable of receiving and imparting moti
the train were in a straight line or on a curve so
cause the side of one carriage to form an angle
that of the adjoining one. The details of this
ingenuity, which is here referred to simply as
striking illustration of the powers of the univers
coupling, are given in Hebert's 'Engineer's and
Encyclopædia,' vol. ii. pp. 465, 466.

When power is conveyed to a considerable
means of a series of revolving shafts, the motion o
irregular and uncertain; but this evil may be, in
sure, rectified by placing a fly-wheel to equalize
at or near the extremity of the series.

In all contrivances for disengaging and re-e
chinery while in motion, it is necessary to consid
of inertia, which renders it both difficult and
bring a machine suddenly from a state of rest to
motion. When the connection is formed by toot
ged wheels this difficulty is especially felt, and
while it is very easy to disconnect such wheels,
commonly termed, to throw them *out of gear*,
moving the axis of one of the wheels, or by slidin
along its axis until its teeth are disengaged fro
they cannot be re-engaged without great risk of
teeth. In this respect, as shown under Wheе
312, a connection by means of straps or cords is f
Such a connection always has some degree of
power of yielding under the effect of sudden
when employed in connection with the fast and
a contrivance illustrated under Saw-mill, P.
479, it affords perhaps the safest method known o
stopping machinery. Sometimes a similar effect
by the use of an endless cord or band passing ro
leys, one of which is on a moveable axle, by th
which the tension of the band may be destroy
neither the axle of the driving pulley, nor that
one, can be made moveable, the same effect may
by the use of a third pulley or drum, so mou
pressing it against the band the tension may be
any desired amount, or by removing it out of th
be destroyed. The small wheels, *e*, *e*, in the c
Brunel's block machinery, given under Saw-m
Fig. 6, though merely employed for increasing
and not for taking it off to stop the revolving sa
trate such a contrivance. Bands are sometimes
sliding pulley which may be locked to the machi
sure by engaging it with revolving glands, or w
coupling; but in such a case the shock of st
avoided, though the elasticity of the band, and
slipping on the pulley under the effect of sudde
render it less hazardous than with cog-wheels.

Clutches or bayonet connections are sometim
to start a train of wheelwork in which the teet
are never actually thrown out of gear. The dis
such a mode of coupling may be in a great mea
by the use of a *friction clutch*, in which the dri
projections are attached to an elastic open hoop
metal, sprung on to a smooth wheel or drum, an
tightening screws, by which it may be pressed t
of tightness; so that while it will slip round unt

the machinery is overcome in starting, or under the effect accidental resistance, its friction will be sufficient, under inary circumstances, to cause it and the drum to turn toge- r as if they were one piece.

In another contrivance of the same character the connection effected by pushing a solid conical wheel or drum, mounted on one shaft, into a hollow cone attached to an adjoining aft, in doing which the friction, and consequent power of ansmitting motion, increases in proportion to the advance of e solid into the hollow cone. Friction wheels, with their eripheries formed of the end of the grain of wood, which ay be compared to a collection of indefinitely small teeth, ressed together by levers, or friction wheels or discs placed de by side so as to be either a little separated or pressed gether at pleasure, are also occasionally used. A coupling hich starts the machinery gradually by friction may be con- ected with a fixed clutch or bayonet coupling in such a way at, when once started, the connection of the machinery ll be rigid, and no longer dependant upon mere friction.

Very full details upon the subject of this article are given the excellent 'Practical Essays on Mill-Work and other chinery,' by Robertson Buchanan, with additions by Tred- l and George Rennie, 8vo., Lond., 1841, pp. 262-306, re allusion is made to couplings which disengage them- es under the influence of any undue strain upon the ma- ery, and a plan is proposed for diminishing the risk of aging cogged wheels, by introducing spring spokes in the er wheel of the pair, the teeth of which are more likely to k than those of the pinion. The subject is also treated at e length in Barlow's 'Treatise on Manufactures and Ma- ery,' in the 'Encyclopædia Metropolitana,' sect. 46-51.

OURT BARON. [Manor, P. C.]

OURT, CUSTOMARY. [Copyhold, P. C. and . S.]

OURT ROLLS. [Copyhold, P. C. and P. C. S.]

OURTOIS, JACQUES, a celebrated battle-painter, monly called le Bourguignon, was born at St. Hippolite, Besançon, in Franche-Comté, in 1621. He was in- ted in his art by his father, an obscure painter, and having e the acquaintance of a French officer at Milan, whither ad gone very young, he entered the French service, and owed the army for three years, drawing from the life all most striking incidents and scenes of the camp, the march, the battle-field, by which means he learned to portray subjects with extreme boldness and truth. He made rwards the acquaintance of Guido and Albani at Bologna, thus had every opportunity of perfecting himself in the nical part of his art. In Rome likewise he made the ac- intance of the principal painters of his time—Pietro da tona, M. A. Cerquozzi, and others.

After spending some years in the execution of various works Florence and in Venice, during which time he became a band and a widower, he returned to Rome, and entered as y-brother into the order of the Jesuits, for whose estab- ment he painted several religious works, besides many tles for strangers and others unconnected with the institu- . He was most successful in small works; his style did require large figures, and he had little ability to paint m. His pictures are not uncommon; there are several in t of the principal galleries of Europe, and they never fail ttract notice, by their surprising spirit of conception and cution; in colouring also they are warm and characteristic. died of apoplexy, at Rome, in 1676.

ourtois appears in Italy to have Italianized his name into *como Cortese*, as some of his etchings are so marked, and name is so written by Italian writers: he was also called *gognone* in Italy.

is younger brother Guillaume Courtois, born in 1628, me also a very celebrated painter, but in a different style. was the pupil of Pietro da Cortona, and the friend of lo Maratta, and lived chiefly at Rome, where he died, in equence of taking some quack medicine for the gout, in 9. His subjects are chiefly from sacred history, painted Roman churches, but he frequently assisted his brother; one of his own masterpieces is a great battle of Joshua, he palace of Monte Cavallo, painted for Pope Alexander . His style was correct, and perfectly free from manner. eral of his works have been engraved, and he etched a few es himself. His Battle of Joshua was engraved by A. uvet, in four sheets, and dedicated to Casimir, King of and.

Pascoli, *Vite de' Pittori*, &c.; D'Argenville, *Abrégé de Vie des plus fameux Peintres.*)

COURTS, ECCLESIASTICAL. [Ecclesiastical Courts, P. C. S.]

COUSIN, JEAN, a very celebrated French painter, sculptor, and geometrician, contemporary with Il Rosso and Primaticcio in the sixteenth century. The date neither of his birth nor death is known; but he was born at Soucy near Sens, was the first Frenchman who attained distinction in historical painting, and was the principal favourite at the French court in the reigns of Henri II., François II., Charles IX., and Henri III. He is sometimes in the vague language of false criticism termed the founder of the French school, which however means nothing more than that he was the first distinguished French historical painter. He married the daughter of a French general officer, Lieut.-Gen. Rousseau, of Sens, and he was established chiefly as a painter on glass there, but he generally spent a portion of the year at Paris. His most celebrated picture is the Last Judgment, painted for the Minims of Vincennes, and now in the Louvre. Though not a work of a high order, it is carefully executed, and in parts well drawn though harsh, well foreshortened, and well though highly coloured; it was engraved by Peter de Jode the elder, in twelve sheets: the whole print is four French feet high, by three feet four inches wide, and one of the largest prints in existence.

Many of the old painted windows of the churches of Sens and Paris and elsewhere were from the designs of Cousin. He was also a writer of ability; he wrote on geometry and perspective, and a small work on the proportions of the human body, with illustrative wood-cuts, which went through many editions; the first work was published in 1560, and an edition of the second was printed in 1625, in 4to, under the following title—'Livre de Pourtraicture de Maistre Jean Cousin, Peintre et Geometrien très excellent,' &c.

In sculpture his principal work is the monument of Admiral Chabot, in the church of the Celestines. There are still some remains of his paintings on glass in the church of St. Gervais, which were his principal works of this class at Paris. He was still living in 1589, and much advanced in years.

Cousin, from the circumstance of his having placed a pope in hell, in his picture of the Last Judgment, is supposed by many to have been a Protestant, or of the pretended reformed church, as Felibien expresses himself, but such an unfounded report, he continues, with considerable simplicity, is refuted by the life he led, by the regularity of his conduct, and the correctness of his principles.

(Felibien, *Entretiens sur les Vies, &c., des Peintres.*)

COUSTOU, the name of two very distinguished French sculptors, brothers, of Lyon.

Nicolas Coustou was born in 1658, and having received some instruction from his father, who was a carver in wood, he went in his nineteenth year to Paris, and became the pupil of his uncle, Antoine Coysevox, a distinguished sculptor. When only 23 years of age he obtained the grand Academy prize in sculpture, and went in consequence as a pensioner to Rome. In Rome Coustou paid more attention to the modern than the antient works in sculpture. His favourite masters were Michelangelo and Algardi, whom he studied for their opposite qualities, endeavouring to combine in his own works the merits of each; to modify the harsh vigour of Michelangelo by the less evident grace of Algardi. He remained in Rome three years, but from his peculiar taste and the character of his studies, it was not to be expected that he could have appropriated much of the symmetry and dignity of the antique.

His first great work in Paris was the colossal group representing the junction of the Seine and Marne, now in the garden of the Tuileries: there are four other statues by Coustou in the same garden, of which the best is the Berger Chasseur. He made also the celebrated group of the Tritons of the rustic cascade at Versailles. But his work of highest pretensions is the Descent from the Cross in the choir of the cathedral of Notre Dame, generally called le Vœu de Louis XIII.; the figures of Louis XIII. and Louis XIV., which were on each side of it, until 1831, when they were destroyed, were by Guillaume Coustou and Coysevox respectively. He executed many other distinguished works at Lyon and at Paris, for which he was well rewarded by Louis XIV., and a small pension was settled upon him by the city of Lyon: he enjoyed two pensions from the crown, amounting together to 6000 francs. He died in 1733, having been forty years a member of the French Academy.

Guillaume Coustou was born in 1678, and was also the pupil of his uncle Coysevox. He went likewise to Rome as a pensioner of the French government; it appears however that he never enjoyed the pension, or it was at least paid with such irregularity that he was forced to earn his own maintenance, for which he was chiefly indebted to Le Gros, who employed him on his bas-relief of St. Louis of Gonzaga.

After his return to Paris he executed many excellent works, several of which were for the gardens of Marly, but are now at the Tuileries; others are at Versailles: the two celebrated grooms checking restive horses, somewhat in the actions of the antient groups of Monte Cavallo, now at the entrance of the Champs Elysées, were at Marly until 1794. Still more celebrated works are the statues of the façade of the Château d'Eau opposite the Palais Royal; and the more extensive bas-reliefs of the principal entrance of the Hôtel des Invalides. He executed also the colossal bronze figure of the river Rhône for the monument of Louis XIV. at Lyon; the corresponding figure of the Saône was by Nicholas Coustou, and they are now both preserved in the town-hall of Lyon; the statue of Louis XIV. was destroyed during the revolution. He died in 1746, director of the Royal Academy of Painting and Sculpture. The French are not agreed as to the relative merits of these two sculptors, some preferring Nicholas, and others Guillaume: the style of the latter in design varied less than that of Nicolas from the antient standard of proportions, but they were both more French in their tastes than Greek.

Guillaume Coustou the Younger, likewise a distinguished artist, was the son of the elder Guillaume. He was born at Paris in 1716, obtained also the grand prize of the Academy in sculpture, studied five years in Rome, and died treasurer of the Academy in 1771. He designed the sculptures of the front of the church of St. Geneviève, which were removed when that building was converted into the Pantheon: they were executed by a sculptor of the name of Dupré.

(De Fontenai, *Dictionnaire des Artistes*, &c.; D'Argenville, *Vies des fameux Architectes et Sculpteurs;* Galignani, *History of Paris.*)

COUTO, DIOGO DE. [Barros, P. C.]

COWLEY, MRS. HANNAH, whose maiden name was Parkhouse, was born at Tiverton, in Devonshire, in 1743. She was married, about 1772, to Mr. Cowley, a captain in the East India Company's army, by whom she had three children. Her husband was a man of taste, whom she consulted in the composition of her works: and the first of her plays, 'The Runaway,' was commenced half in jest, on her husband rallying her for expressing, in the theatre, a belief that she could write a drama. Her life was spent in the dignified quiet of an English lady, mixing but little in the world, and, notwithstanding her dramatic turn, visiting even the theatre very seldom. She died at Tiverton on the 11th of March, 1809, having survived her husband about ten years. 'The works of Mrs. Cowley, Dramas, and Poems,' were published in a collected edition, 1809-1813, 3 vols. 8vo. Among them are three narrative poems of considerable length, but indifferent merit, 'The Maid of Aragon,' 'The Scottish Village,' and the 'Siege of Acre.' The artificial character of her poetical taste is indicated by the fact that she was the 'Anna Matilda' who corresponded with Mr. Merry under his newspaper signature of 'Della Crusca.' Her two tragedies likewise are worthless. Of her nine comedies several are much better. One of them, 'The Belle's Stratagem,' which first appeared in 1780, still maintains its place as a lively and excellent acting play: and 'A Bold Stroke for a Husband,' a play somewhat similar, has been repeatedly revived both in its original shape and with alterations.

COXIE, MICHAEL, a very celebrated old Flemish painter, born at Mechlin, in 1497. He studied first under Bernard van Orley, and devoted afterwards much time to the study of the works of Raphael at Rome, and even there obtained distinction as a fresco painter. He returned with an Italian wife, and with a good stock of Italian art, to his own country, where he enjoyed great renown and amassed a large fortune by his works. They were chiefly altar-pieces, and many of the best of them were carried to Spain, but he kept a considerable gallery of some of his choicest productions, in three houses or palaces which he possessed at Mechlin. He died at Antwerp in 1592, aged ninety-five, in consequence of a fall from a scaffolding, whilst engaged in painting a picture in the town-house of that place.

Though the works of Coxie had much merit, he is now better known for his elaborate copy of the Adoration of the Lamb, in the church of St. Bavon, at Ghent, by the brothers *Van Eyck, than* for his own original productions. It is a large altar-piece with folding-wings, in two hori
sions, an upper and a lower division, each with two
a side; six of these wings are now in the royal
Berlin, and the other parts are still at Ghent. Cox
the two centre pictures of this altar-piece is also in
Gallery, God the Father, and the actual Adorati
Lamb; other parts are in the Pinakothek of Muni
the royal gallery of the Hague: in Munich are
figures of John the Baptist and the Virgin Ma
Hague are all the wings. The copy was made by
Philip II. of Spain, and finished in 1559, after tw
uninterrupted labour, for which he was paid 40
about 400*l*. sterling, or sixteen times as much as th
Charles V. paid Titian for his portrait in 1530
painting this picture, Coxie complained to Phili
could not procure a blue good enough to paint th
drapery with, upon which Philip wrote to Titian
ultramarine, which Coxie received, and he used a
the value of thirty-two ducats over the single blue
the Virgin. The copy was painted with extreme
kept somewhat softer than the original; it rema
long time in the chapel of the old palace of Madri
it was removed and sent to Brussels by Genera
during the French occupation of Spain. Cean
says that Coxie himself took it to Spain.

(Van Mander, *Leven der Schilders; Kunst*
23-27, 1824; Passavant, *Kunstreise durch Englan*
gien; Waagen, *Verzeichniss der Gemälde-Sam*
Königlichen Museums zu Berlin.)

COYSEVOX, ANTOINE, one of the most dis
of the French sculptors, was born at Lyon in 1640:
was originally Spanish. He distinguished himself
early as his seventeenth year by a statue of the Vir
went afterwards to Paris to perfect himself under
He was scarcely twenty-seven years of age when he
by the Cardinal de Fürstenberg to decorate his
Saverne in Alsace, in which he was occupied for
After the completion of these works he returned to
a reputation equal to that of any of his Parisian
raries, and he was elected a member of the Academ
He made two bronze statues of Louis XIV., one fo
of the Hôtel de Ville, and the other, a colossal
statue, for the States of Bretagne. Among his most
works are the two winged horses, in marble, m
Fame and Mercury, placed one on each side of th
to the garden of the Tuileries from the Place de la
they were originally in the garden of Marly: the
most elaborately worked, but they show considerabl
The horse of Mercury has a bridle, and that o
without one, a conceit which is said to have mu
Napoleon. In the garden of the Tuileries there
young fawn, a flute-player, and two other figures, by
He made also for the garden of Marly the groups o
and Amphitrite, for Chantilly the marble statue of
Condé, and many works for Versailles, including tw
fications in bronze of the rivers Dordogne and Garon
also of the finest sepulchral monuments in Paris are
vox, those of—Cardinal Mazarin at Quatre Nation
Ferdinand de Fürstenberg at St.-Germain-des-Prés,
at St. Paul; and the most elaborate of all, that of
St. Eustache. Coysevox was also an eminent s
busts. When he died, in 1720, he was chancell
Royal Academy of Painting and Sculpture.

(De Fontenai, *Dictionnaire des Artistes*, &c.;
ville, *Vies des fameux Architectes et Sculpteurs;* G
History of Paris.)

CRAB, a kind of portable windlass, or machine f
weights, or otherwise exerting force, by winding
chain round a horizontal barrel.

Some confusion is occasioned by the indefinite m
which such terms as windlass, crab, and crane, to
might perhaps add capstan, are applied to various
for the efficient and economical employment of hum
upon the mechanical principles explained under Wi
Axle, P. C., p. 307. Windlass, P. C., p. 444,
times used as a general term for all such contrivances
in a more restricted sense it is applied to such as consi
of a horizontal barrel turned round by means of han
handspikes, or levers, inserted in holes made near its
ties. The term *capstan* is usually confined to a simil
ratus with the barrel placed vertically, as describe
Windlass. Winch and Axle, P. C., p. 436, is
given to several varieties of windlass, distinguished

hine specially so called by being turned, not by handspikes imple levers, but by the peculiar kind of handle called a ch. *Crabs* are windlasses usually, though not always, ed by means of winch-handles, and generally having a ision for multiplying the power by means of toothed gear, lescribed under WINCH AND AXLE. They are usually nted in a strong heavy framework of wood or iron, and, n employed for a temporary purpose, but one which in- es considerable strain, they are either bolted down to mporary foundation, or loaded with heavy weights put the framework. Crabs are much used in building ope- ns, they being often placed on the ground, and employed aise weights by means of a rope carried over a pulley l to an elevated part of the scaffold, as in the case repre- ed under SCAFFOLDING, P. C., p. 499, *fig.* 3. In like they are applied in raising the weights or rammers of driving engines. In the kind of railway scaffold described r SCAFFOLDING, pp. 497, 498, the uppermost carriage orts a crab which lifts a stone or other weight vertically, eing brought directly over it; and in some cases a crab ployed to exert power horizontally, or nearly so. In all it is most important to provide a crab with a ratchet and , or some similar contrivance, to prevent it from running when the application of the power is suspended; and rious accidents have occurred even where such have been oyed, owing to some failure in their action, or to the re of part of the apparatus, it is well to have two separate ts, either of which may suffice to stop the machine if the should fail. An ingenious contrivance for controlling notion of a crab by means of a brake, intended especially abs employed to regulate the descent of heavy bodies, is ibed under SUBMARINE DESCENT, P. C., p. 192.

abs are sometimes termed portable cranes, but the term is properly confined to a different class of machines, h used for a similar purpose. [CRANE, P. C. S.]

AG, the uppermost of the distinctly tertiary strata of and—using this term in a sense which is perhaps gra- y passing away, to be replaced by the larger meaning of ozoic, suggested in this work. The crag of Norfolk and lk is partly a calcareous mass rich in delicate corals; y a subcalcareous sand rich in shells; and partly a rudely egated deposit of sand, shells, pebbles, and bones. To divisions, whose origin is due to different local con- ns, and successive times, Mr. Charlesworth has assigned titles of Coralline Crag, Red Crag, and Mammaliferous . In Mr. Lyell's classification they rank as Pleiocene osits.

RANACH, LUCAS, one of the most celebrated of the German painters, was born at Cranach, near Bamberg, 472. According to a prevailing custom of the time he called after the place of his birth, sometimes also Meister as, and Lucas Mahler, or Luke the painter, from which ears to have originated the false name of Lucas Müller; family name was Sunder.

He was apparently instructed by his father, and in his nty-third year (1495) was appointed court painter to the ctor of Saxony; he served in this capacity the electors deric the Wise, John the Constant, and John Frederic Magnanimous. In consequence of this appointment, nach settled in Wittenberg, the residence of Frederic the se, lived there forty-six years, and earned wealth and repu- ion in abundance; he was owner of several houses there, l was for many years burgomaster of the place. The in- ents in his life are not many, though he lived in an event- time, and there are some few worthy of note. In 1493 accompanied the elector Frederic the Wise to Palestine the Holy Sepulchre, and made drawings of all that was markable and interesting there. For this elector Cranach nted a series of portraits of his ancestors, and in allusion Catherine of Henneberg, Frederic expressly ordered him take great pains with the Henneberg hen, for she had laid house of Saxony a good egg: Frederic the Strong had ained the county of Henneberg with her as a marriage tion. Cranach was particularly attached to the elector n Frederic, and when that prince was taken prisoner by arles V., after the battle of Mühlberg, in 1547, he inter- ed with the emperor in his behalf, but to little purpose, gh he drew a promise from him. Charles was well osed towards Cranach, and requested him to accom- y him to the Netherlands. He had a portrait of himself boy, by Cranach, at Mechlin, and he asked the pain- when it was painted: Cranach informed him when he eight years old, and that to attract his attention so as to enable him to paint the portrait, a beautifully painted arrow was stuck in the wall opposite to where the emperor sat. The narration pleased the emperor, and he dismissed him with a present of a silver plate of Hungarian ducats, of which however Cranach took very few; and he persisted in his refusal to accompany the emperor to the Netherlands. He would not leave his prince the elector John Frederic, with whom he shared his five years' imprisonment at Innsbruck, and upon his release in 1552, his eldest son and Cranach were his only companions on his return home. Cranach retired to Weimar, and died there in the following year, which was the eighty-first of his age, according to the inscription to his memory in the church of St. Jakob.

Cranach was acquainted with many of the principal men of his time and country: he and Luther were intimate friends, and he is said to have brought about the marriage of Luther and Catherine Bora: he appears to have painted Luther's portrait many times, nearly all of which have been engraved, some of them by several engravers. He was acquainted with Melanchthon and Bugenhagen. Cranach had several sons and daughters; Johann, the eldest, studied painting in Italy, and died young at Bologna, in 1536: another son, Lucas Cranach the younger, was born in 1515, and died in 1586 as burgomaster of Wittenberg, and with the reputation of a distinguished painter.

After Cranach's death a medal was struck at Wittenberg to his honour, with his portrait on one side, and the arms granted to him by Frederic the Wise in 1508, consisting in a crowned winged serpent upon a gold ground, on the other.

The principal works of Cranach were executed between 1506 and 1540, and they are nearly all still in Germany, especially in Upper Saxony. In the Dresden Gallery there are twelve, in that of Vienna fourteen, at Munich eight, and at Berlin there are twenty-three attributed to him, but they are mostly of small dimensions. His masterpieces are his altarpieces in various Saxon churches, and one of the principal of these is the large mystical representation of the Crucifixion in the church of Weimar. It is painted on a large panel, with folding wings, which are painted on both sides. The composition is scarcely intelligible, and is selected without taste; it contains portraits of John Frederic and his family, and of Cranach and Luther which are the best figures in it: it is executed with all the laborious care and exactness of the best German painters of that period, of whom Cranach himself was inferior to Albert Dürer alone in his best period, but Dürer's superiority is confined to design and composition. A description of this altarpiece, more remarkable for its execution, size, and singularity, than any other qualities, was published, with engravings, by H. Meyer, at Weimar, in 1813.

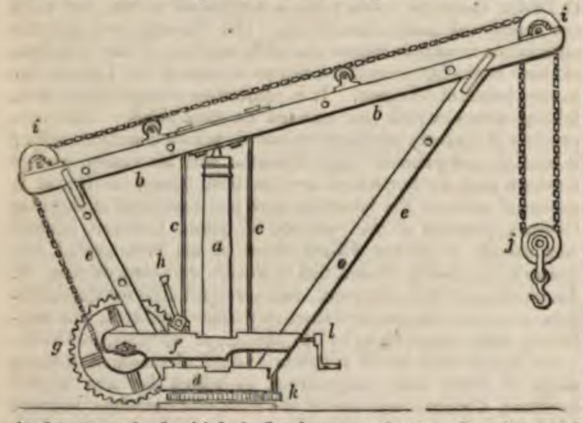
In colour and in all respects except elegance of design, unity of effect and composition, in which he was wholly deficient, Cranach was one of the most distinguished painters of his time; and in execution he was one of the most laborious artists that have ever lived. He was a good portrait painter, an excellent animal painter, and also a good miniature painter, and illuminator of manuscripts: there are several manuscript volumes containing drawings in miniature by Cranach in the library of the University of Jena. Cranach is said to have also engraved both in copper and wood, and many works are attributed to him, but with very little certainty; there are however many prints in both styles after his works, but few of them probably were executed by himself.

There are many German notices of Cranach, more or less detailed, early and recent, and there are at least three distinct lives of him. The first was written by Professor Christ, and published in the 'Acta erudita et curiosa de Franconia,' Nürnberg, 1726; a second was published in 1761, at Hamburg, by C. E. Reimer, 'Historisch-critische Abhandlung über das Leben und die Werke Lucas Cranachs;' the last is the very full life by J. Heller, 'Lucas Cranachs Leben und Werke,' Bamberg, 1821; and Schadow's 'Wittenbergs Denkmäler der Bildnerei, Baukunst, und Malerei,' &c., Wittenberg, 1825, contains descriptions and engravings of works of both the Cranachs. Concerning the engravings and wood-cuts attributed to Cranach, see Bartsch, 'Peintre-Graveur.'

CRANE, a machine employed for raising weights vertically by means of a rope or chain acted upon by a windlass, but carried over a pulley or wheels attached to the extremity of a projecting arm or jib, from the supposed resemblance of which to the neck of a crane the machine is said to derive its name.

The common warehouse crane, which is usually formed of iron, may be compared to an inverted L, the vertical portion of which is so mounted as to form a pivot or axis upon which the whole may be swung round, so that the horizontal arm, which is strengthened by diagonal struts, may either project from the face of the building to which it is attached, so that a rope dropped from its extremity will reach a weight which has been brought within a few feet of the wall in a cart or barge, or may be drawn round with its load, after it has been wound up to the required height, until the load is landed upon one of the floors of the warehouse, through an opening in the side wall. Such a crane may be mounted near the top of the building, and employed for landing goods upon any floor which has an opening immediately under it; and when out of use it may be so turned that the horizontal arm lies parallel with and close to the wall. The rope or chain of such a crane is conducted along the horizontal arm, round one or more pulleys or sheaves, into the warehouse, where it is connected with a kind of windlass or crab, which is usually provided with two sets of gearing, for working at different velocities, so that in raising light goods a much greater speed may be given to the chain with the same motion of the winch-handles than when the load is very heavy. A provision is sometimes added to allow the chain, with its grapnels or hooks, to descend very quickly when unloaded, without detaching it from the handles, or leaving it to descend and unwind itself from the windlass merely by its own weight. Where it is allowed to descend by gravity alone, a brake or fly should, in all cases, be added to regulate and control its descent.

Wharf-cranes are frequently of somewhat different construction, owing to the circumstance that they usually stand alone, that is to say, that they are self-supported, instead of being attached to and supported by a wall, or a post secured to a wall. The annexed cut represents such a crane of approved construction. In this figure *a* is a vertical pillar of iron or wood, the lower end of which is firmly secured to a foundation of masonry, while the upper end terminates in a pointed or conical pin, upon which, as a pivot, the revolving part of the crane rests and turns; *b*, *b* is the jib, which is fixed in an oblique direction, and projects, though unequally, on each side of the pillar; *c*, *c* are wrought-iron rods descending from the jib *b* to support a massive collar *d*, which is so constructed as to turn smoothly and steadily round the base of the pillar; and *e*, *e* are struts or braces abutting upon the collar *d*, and supporting the ends of the jib. Both the jib and its struts may be made double, and connected by blocks and transverse rods, the ends of which are shown by small circles in the cut. *f* is a massive framework attached to the revolving part of the crane, and giving support to the windlass *g*, which may be compared to a crab. The barrel is fixed on the axis of the large toothed wheel, which is turned by a small pinion on the axis of the winch-handle *h*. From the barrel the chain or rope is conducted over the wheels or pulleys *i*, *i*, mounted at the ends of the jib, between the two parallel pieces of which it consists, and under the moveable pulley or runner *j*, which carries the hook or grapnel to which the load is to be attached. The end of the chain is then carried up and secured firmly to the jib. By this arrangement the power is multiplied in proportion to the difference between the diameters of the wheel and pinion by which the chain-barrel is worked, and is further doubled by the adoption of the runner [Pulley, P. C., p. 118] or moveable pulley to which the hook is attached. Where so great a power is not required the runner *j* may be dispensed with, and the hook may be attached to the end of the chain, in which case the load *will be raised* in half the time, but, supposing the power ap-



plied to the windlass to be the same, the weigh
cannot exceed one-half of what may be raised wit
Immediately beneath the collar *d* is a large hori
wheel, fixed firmly upon the pillar *a*; and at
engaging with it, and worked, through the med
gear not shown in the cut, by turning the winc
contrivance the crane may be turned round so a
hook over any object lying within its circular
after it is raised from the boat or carriage from
be unloaded, the whole machine may be turned
to deposit it upon any other point within the swe
jecting jib.

The above is only one form out of many whi
represented, but it may serve to convey an id
generally. Though it is in most cases a conven
ment, it is by no means essential that the win
form part of the revolving structure of the cra
cases the turning of the windlass is effected no
handles, but by a tread-wheel worked by men,
horses or oxen. In others the waste or surplu
steam-engine is made available for the purpose. B
tise on Manufactures and Machinery, in the 'E
Metropolitana,' sections 396, 397) describes two
working cranes by this or other mechanical power
by the compression of air into a strong vessel; a
by exhausting a vessel or receiver. In these
as in Bramah's plan for working cranes by hyd
sure, which is described in the same work, the p
transmitted to a considerable distance, and conne
disconnected from the crane by the turning of a c
other modes of working cranes, one which clai
its singularity rather than for any decided merit
was patented by Mr. L. Wright, and brought i
at the West India Docks, in which the power
winch-handles in turning an axis, is communicat
to a series of levers, which, acting in succession
rollers projecting laterally from the rim of a
mounted on the axis of the chain-barrel, forces i
slowly, but with great power. Representations
also of Revis's patent crane, in which the bar
intervention of ratchet-wheels, turned round by
ing motion of a single lever of considerable leng
in Hebert's 'Engineer's and Mechanic's Encyc
'Crane.' In Jamieson's 'Dictionary of Mechan
art. 'Crane,' is a full account and detailed rep
Watt's jib-crane, a machine peculiarly adapted
purposes, owing to its portability, power, and p
not only over every point lying in a circular line
projecting jib is the radius, but also over every p
within that circle. In this crane the central pil
machine is required to be portable, is held fast
and the jib, instead of lying across its upper
placed in a position resembling the struts mar
above cut; its lower end abutting upon a collar
the pillar, while the upper end is supported b
nected with the top of the pillar, which tackle,
by a separate winch, affords the means of chang
formed by the jib with the pillar at pleasure, and
of bringing the load nearer to or removing it far
centre of motion, as circumstances may require.
able cranes are made to balance, by means of co
so as not to need guy-ropes. Such may be mo
base furnished with wheels or rollers. Some c
furnished with an apparatus for weighing as well
load. Several of these varieties of the ordinary
scribed by Jamieson, who also, under 'Cellar-c
a simple but useful contrivance for raising and lo
through a cellar opening, by means of a windla
a portable framework.

The beautifully simple and efficient apparatus
some writers as the Chinese crane, a contrivance
be advantageously substituted for many complicat
and expensive machines employed for raising
described under Winch and Axle, P. C., p.
machines employed for similar purposes are n
Crab, P. C. S.

CRANK, in machinery, is a bend in an axle
reciprocating motion in a rod is made to produc
motion of the axle and of a wheel which may
with it.

The formation of a crank is well known, and
that while the plane of the crank makes any an
rod, a movement of the latter in, or nearly in,

will cause the axle and, with it, the wheel to
when the plane of the crank is coincident with
atter can, of course, have no power to produce
the momentum which the crank and axle may
ly acquired in turning, immediately carries the
former beyond that position, when a movement
ontrary to the direction of the former movement
circular motion of the crank and axle.
old has computed a table in which are shown the
d by rods of different lengths, in turning the
so the strains on the axle at the different angles
ane of the crank may make with that in which
ith the direction of the rod; and it is in order
s far as possible, the motions produced by these
es that a fly-wheel is generally employed with a

d planet wheel which was devised by Mr. Watt
ose of converting a reciprocating into a circular
apparatus consisting of a toothed wheel, which
e axle, and one which is attached to the lower
reciprocating rod. The latter wheel does not
ntre, but, as the rod moves upward and down-
th, driving those of the other wheel, cause the
ith it the axle, to revolve. This contrivance,
n use when a considerable velocity of rotation is
e it causes the axle and wheel to make two revo-
time that one only would be produced by a
superseded, in steam-engines, by the latter.
ELS, P. C., p. 506.]
A, a genus of plants belonging to the natural
idaceæ. It has 4 sepals; 4 unguiculate petals
the calyx, and not closing over the stamens
ation; 8-28 stamens; the torus elongated or
; the berry, stalked between ovate and globose,
; a thin pericarp. The species are unarmed
es with trifoliate leaves and terminal cymes or
rge flowers.
a, Garlic Pear, has 20-24 stamens inserted on the
eptacle, longer than the petals; the berry ovate;
ate, acute; the petals lanceolate. It is a native
ces and thickets near the sea-side in Jamaica.
ant has a nauseous smell and a burning taste.
he root is said to blister like cantharides.
the Tapia or Common Garlic Pear, has 8-16
nate, about three times as long as the petals; the
vary as long as the stamens; the stigma sessile,
fruit globose. This plant is a tree about twenty
Its fruit is the size of a small orange. It is
from the West India Islands and from South
e fruit has the smell of garlic, and communicates
nimals that feed on it. The bark is bitter and
as been employed in the cure of intermittent

los, the Bilva or Mahura, is a small tree bearing
oidal berry with a hard shell, and 10-15 cells
, besides the seeds, a large quantity of a tena-
ent gluten, which on drying becomes very hard,
transparent; when fresh it may be drawn out
of one or two yards in length, and so fine as
perceptible to the naked eye, before it breaks.
s now however transferred to the family Auran-
r the generic name Ægle. It is the Feronia
ome authors. It is found in all parts of the East
fruit is nutritious and aperient, and very deli-
aste. It is recommended by European physicians
s a valuable remedy in habitual costiveness, and it
to fail to produce its aperient effects. The root,
ves are also used in fevers by the Malabar phy-

Flora Medica; Don, *Gardener's Dictionary*.)
, CASPAR DE, one of the most distinguished
orical painters, was born at Antwerp in 1582,
ucted by Raphael, the son of Michael Coxie.
inguished himself at Brussels, where he painted
altar-pieces, but he settled eventually at Ghent,
atest works are still preserved in the museum
us churches: many of his works however are
r Germany and the Netherlands. He died at
9.
of Crayer, in their style, subjects, and dimen-
erally of the highest pretensions, and they are
gree successful, but yet are frequently formal
esides other great works, he painted at Ghent twenty-one large altar-pieces for the principal churches of that city, some of which, for their fulness and dignity of subject, correct and vigorous design, and the judicious bestowal of extra care in the execution of their more important parts, command our highest admiration, notwithstanding a very sensible coldness of effect and a certain formality of treatment. Even the gorgeous taste of Rubens was vividly impressed with the great merits of Crayer: upon seeing one of his pictures in the refectory of the abbey of Affleghem, he is said to have exclaimed, 'Crayer! Crayer! no one will ever surpass you.'

There are fourteen of his works in the museum of Ghent, comprising some of his principal pictures, as — St. Rosalia crowned by the infant Christ; the Martyrdom of St. Blaise, his last work, painted in his eighty-sixth year; and three of the pictures painted for the triumphal arches erected at Ghent upon the occasion of the formal entry of Prince Ferdinand, Infant of Spain, into Ghent, in 1625. One is Francis I. surrendering his sword to Lannoy after the battle of Pavia in 1525; another, the descent of Charles V. upon the coast of Africa in his expedition against Tunis, ten years afterwards: the figures of these works are colossal, and they are slight in their execution, but at the same time remarkably vigorous and correct. There are a few works by Crayer in Spain, and he is supposed to have visited that country in the reign of Philip IV. Few of his great works have been engraved, and they have comparatively seldom been moved; they are too large for the commerce of picture-dealers. The large altar-piece of the Virgin and Child enthroned amongst angels and surrounded by saints, in the gallery of Munich, about 19 feet by 12, and by no means one of the best of his works, cost, with the copy that was substituted in its place, 20,000 rix dollars. Sir Joshua Reynolds saw this picture in the gallery at Düsseldorf, and makes the following just observations upon it in his 'Journey to Flanders and Holland:'—'Though it cannot be said to be defective in drawing or colouring, yet it is far from being a striking picture. There is no union between his figures and the ground; the outline is everywhere seen, which takes away the softness and richness of effect: the men are insipid characters, and the women want beauty.'—'The dead and cold effect of this picture, as well as many others of modern masters in this gallery, sets off those of Rubens to great advantage.' It was painted in 1646, and the lower figures are portraits of Crayer and his family.

(Descamps, *La Vie des Peintres Flamands*, &c.)

CREDI, LORENZO DI, one of the best of the old Florentine painters and sculptors, was born at Florence about 1453. His real name was, according to Vasari, Lorenzo Sciarpelloni, and he acquired the name of Credi from his master, a distinguished goldsmith at Florence in that time. Lorenzo however did not remain long with Credi: his skill in drawing warranted his exchanging the art of the goldsmith for that of the painter, though he had distinguished himself as a goldsmith, and he accordingly entered the school of Verrocchio, in which he was the fellow-pupil of P. Perugino and of Lionardo da Vinci, the latter of whom he afterwards imitated.

Lorenzo was Verrocchio's favourite pupil; and when Verrocchio went to Venice, to make the bronze equestrian statue of Bartolomeo Colleoni [VERROCCHIO, P. C.], he left Lorenzo in charge of all his affairs at Florence. Lorenzo visited his master several times while he was engaged at Venice, and after his unexpected death in 1488, brought his body home to Florence. Verrocchio made Lorenzo di Credi his principal heir, and expressed a desire in his will that he might be intrusted with the completion of the monument of Colleoni, adding the observation, 'quod est sufficiens ad id perficiendum,' because he is equal to the undertaking. Credi did not take possession of any of Verrocchio's property, except his drawings and works of art: the rest he made over to his relations.

It is not enough to say that Lorenzo di Credi was a good painter for his time: he was an excellent painter for any time. His Birth of Christ, formerly in the monastery of Santa Chiara, but now in the gallery of the Academy at Florence, is one of the best works in that excellent collection: it is excellent in expression, in colouring, and in the execution both of the principal and the accessory parts. His best work however, in the opinion of Vasari, is the picture of the Madonna and Child, with Saints Julian and Nicolas, painted for a chapel of the Convent of Cestello, but at present in the Louvre at Paris, No. 958, and in excellent preservation. Vasari mentions many of Lorenzo's works, several of which

[illegible]

[illegible] They have [illegible] and they are generally engaged in some business in which their savings can be profitably employed. As a country increases in wealth, many persons acquire capital which they cannot employ in their own business, or can only employ by offering inducements to purchase in the shape of deferred payments. Others, again, inherit capital from which they wish to derive an income without the trouble of personally superintending its application. It is from these classes of persons that lenders of capital arise; and they have no difficulty in finding borrowers. Setting aside that countless class of mankind whose maxim it is to get money, or money's worth, honestly if they can, but at all events to get it—who will borrow whenever others will lend, and reckon the loan as so much money earned, most men have an instinctive perception that the next best thing to having capital of their own is to have the use of the capital of others. The efficacy of capital is very soon discovered as an instrument for the production of wealth, and those who have it not are willing to pay for its use, or, in other words, to share with a capitalist the profits of their own industry, on condition that he intrusts to them such funds as they require for making it productive. Thus as soon as a sufficient capital exists, a system of credit has a natural tendency to arise, and will continue to grow with the increase of capital, unless it be checked by a general insecurity of property, by imperfect legal securities for the payment of debts, or by a want of confidence in the integrity of the parties who desire to borrow. When the society and laws of a country are in a sound state, and capital is abundant, credit comes fully into operation.

[illegible]

Stated in this manner, the truth of these pro[illegible] yet so great is the influence of credit [illegible] enterprise, that it is constantly mistaken for a [illegible] agency. Thus it is said, for example, th[illegible] credit is freely obtained in a country, great [illegible] result; and it is undeniable that facilities in [illegible] and prosperity are ordinary concomitants; but [illegible] equally the results of an abundance of capital se[illegible] ment, under circumstances favourable for its [illegible] credit be granted too freely for the amount of ca[illegible] it is supported, or if it be forced beyond the natu[illegible] of trade, speculations and improvidence are encou[illegible] are ruinous to the parties concerned, and deeply [illegible] society. An apparent prosperity exists for a time the day of reckoning arrives, it is discovered tha[illegible] stead of creating capital, has merely diverted it i[illegible] vestment to another more speculative and hazard[illegible] best can only be made ultimately profitable by a [illegible] of the credit by which it was encouraged. But if be limited or withdrawn, what becomes of the fict[illegible] tal upon which so much reliance had been placed? any failure of the enterprise, the capital by which [illegible] ducted is gone at once. This could not happen created capital; but it is perfectly accounted for understood that capital, however it may be circ[illegible] made accessible by credit, in order to be applied [illegible] object must have been withdrawn from another, to liable to revert. As one of the forms in which ca[illegible] tributed, a system of credit is of the highest val[illegible] relied on as an independent equivalent of capital, it or fraudulent.

As yet that description of credit which consists [illegible] payments for goods has only been generally advert cannot close this article without a special notice of its liar character and effects. This system of credit is rally resorted to by tradesmen to increase their business; it is undeniable that deferred payments offer a strong ptation to purchase. We are always eager to possess, and cost of possession appears small in remote perspective. n a customer buys an article for which he is not to pay welve months, he becomes indebted for its value, and he lso, in fact, borrowed that amount of the tradesman, to h he must ultimately repay—1st, the cost price of the e; 2ndly, the profit upon the sale; and, 3rdly, the year's est upon the amount advanced. The tradesman, if he capital, and can rely upon ultimate payment, is very glad courage purchases, and not only to sell his goods, but to e a high rate of interest for deferred payments. If he not a sufficient capital, he must borrow money from others able him to give credit; and, of course, he will charge customers a higher interest than he has paid himself. ther case he runs considerable risk, for the debts con- d in this manner are devoid of all security. The goods pplied and consumed; and if the parties fail in payment, can be no restitution or compensation. When the n is fully established, many persons avail themselves of honestly; others are improvident, and, without inten- fraud, exceed their means, and become insolvent; and s accidental circumstances may prevent the tradesman ecovering his debts. His risk, therefore, is exceedingly ; and in charging interest for his loans, he must cover losses. He consequently charges not only a reasonable st for the risk which he runs in each case, but also an nce against all the losses which he may incur in his ss. Thus a customer pays the price of his own pur- , a high rate of interest for his loans, and a portion of npaid debts of other people. Nor can any check be upon the creditor, as in other forms of credit. No ic sum is advanced with a stipulated interest; but a gross t is due, in which the rate of interest is concealed. It e exorbitant, and out of all proportion to the value of rticle supplied and the accommodation given; but it is parable from the delusive price. This circumstance is vious encouragement to fraud; and it has a tendency to prices injuriously to the consumer; an evil which even ds itself, in a great measure, to purchases paid for in money.

s the abuse, however, or the excessive use of this form dit, which is mischievous. If properly used, and within able limits, it is as useful as credit in any other form. examples will suffice to illustrate this position. The ts of different consumers are irregular; their consump- constant. Within the year their receipts and expenditure e about the same; but in point of time, they cannot be ately balanced and adjusted one to the other. This m of credit enables them to provide for themselves and families without privation, and at the cost of no one else. operation scarcely perceptible, their receipts and ex- es are adjusted. If, instead of satisfying their wants, they suffered privation, trade would have been injured and al employed less fully. Again, a man who pays for ything he consumes a year hence practically adds to his al a sum equal to the value of his consumption. He a whole year of productive industry in advance of his subsistence. It is true that he will ultimately have to r it, together with a high interest; but if he has been in the meantime, to apply this additional capital so pro- vely as to leave a balance in his favour, he has enriched elf and the community. The tradesmen who have trusted , and the capitalists by whom they have been aided, will made a profit upon his consumption, and have realized interest upon their loans; while he will have given more loyment to capital and to labour than he would have been to give, if he had been compelled to pay for his own sub- ence from day to day.

n various other ways credit, in this form, is a valuable iliary to capital and industry; but whenever it is inju- ously given or accepted it becomes injurious. In this ect it does not differ from other forms of credit. The uses of credit in general have been already explained. whatever form it is judiciously and honestly applied it is an cient agent in the circulation and productive use of capital; whenever it is used without judgment or fraudulently ed, it becomes injurious, and wastes capital instead of raging its growth. All great means conducive to social d are, unhappily, liable to perversion and abuse. The public credit of nations and mercantile credit have too often been abused, as recently, in the most signal manner, by the Americans; and the system of tradesmen's credit has also been shamefully perverted; but all alike are conditions inseparable from the application of capital to the infinite purposes for which it is required. The advantages of credit are so great that it will always be extensively used in every form of which it is susceptible; but its evils may be mitigated by the judgment and experience of capitalists, and by improved laws for adjusting the relations between debtor and creditor.

CREDIT, LETTER OF, is an order given by bankers or others at one place, to enable a person to receive money from their agents at another place. The person who obtains a Letter of Credit may proceed to a particular place, and need only to carry with him a sum sufficient to defray his expenses; and it gives him some of the advantages of a banking account when he reaches his destination, as he may avail himself of it only for part of the sum named in it. If it were not for the convenience which a Letter of Credit affords, a person who was intending to make a tour on the Continent, for example, would be under the necessity either of taking with him the whole of the sum which he would require during his absence, or of receiving remittances from home, addressed to him at particular places.

A Letter of Credit is not transferable. By a strict interpretation of a clause in the Stamp Act (55 Geo. III. c. 184), an instrument of this nature would seem to be liable to the same duty as on a bill of exchange payable to bearer or order; but in practice the duty is openly evaded. If the law were more stringently acted upon, evasion of the duty could be easily practised, as a banker, instead of granting a written instrument, could advise his agent privately to pay certain sums to certain parties, according as the agent might be advised.

CREOSOTE. [Creasote, P. C.]

CREPIDO'PTERIS, a genus of fossil ferns, which Presl substitutes for Pecopteris of Brongniart, in the case of two species, one from Stuttgardt, the other from Newcastle.

CREPIS, a genus of plants belonging to the natural order Compositæ, the division Cichoraceæ, and the section Lactuceæ. It has many-flowered heads; a double involucre, the inner of one row, the outer of short lax scales; the fruit terete, narrowed upwards or obscurely beaked. Most of the species of this genus are common weeds in the hedges of Europe. Five of the species are found in Great Britain. The most common is the *C. virens*, which has the outer involucral scales adpressed linear, the inner ones glabrous within; the leaves lanceolate, remotely dentate, runcinate, or pinnatifid, the uppermost leaves linear, arrow-shaped, clasping with flat margins; the stem subcorymbose; the fruit shorter than the pappus, oblong, slightly attenuated upwards, with smooth ribs. This is the *C. tectorum* of Smith, but the true *tectorum* has revolute margins to its upper leaves, and other points of difference, and has never been found in Great Britain.

The other British species are, *C. pulchra*, a rare plant found in Scotland; *C. biennis*, also rare, found in chalky places in England; *C. succisæfolia*, common in woods in the north of England; *C. paludosa*, not uncommon in damp woods and shady places.

(Babington, *Manual of British Botany*.)

CRESCENTIA, a genus of plants belonging to the natural order Solanaceæ. It has a 2-leaved equal deciduous calyx; the corolla campanulate, with a fleshy tube much shorter than the ventricose 5-cleft unequal crisped limb; 4 stamens, didynamous, with the rudiment of a fifth; the fruit gourd-like, 1-celled, with a solid shell, internally pulpy, many-seeded. The species are large spreading trees, with solitary flowers rising from the trunk or branches.

C. Cujete, Cujete or Common Calabash-tree, has oblong acute or obtuse leaves, cuneate at the base, and in fascicles. This plant is a native of the West India Islands and Spanish Main. It is a tree about twenty feet high, and is readily distinguished from all others by its habit. It sends out large horizontal branches, which bear fascicles of leaves at various distances. These leaves are from four to six inches long. The flowers are scattered over the older branches; the corolla is large, somewhat campanulate and constricted below the middle, which gives the upper part a ventricose character. It does not wither up as other corollas, but becomes putrid, giving out a nauseous and intolerable odour. The form and size of the fruit is very variable, being from two inches to a foot in diameter. It is covered with a thin skin, of a greenish yellow colour when ripe, and under this is a hard woody shell which contains a pale yellowish soft pulp, of a tart unpleasant flavour, surrounding a great number of flat seeds. The shell is of great use to the inhabitants; the smaller oblong ones are formed into spoons and ladles, the larger ones form drinking cups, basins, and bowls for every variety of domestic purposes. They will even bear fire, and are used for boiling water in. The Caribs generally carve the outside of these vessels with a variety of grotesque figures. The pulp is sometimes eaten by the natives, but it is not much sought after. A syrup is prepared from it in the West Indies, which has a great reputation as a cough medicine. The pulp is also used as a poultice in cases of abscess or bruises. The leaves and branches and pulp of the fruit are eaten by cattle in times of scarcity. The wood of the tree is tough and flexible, and well adapted for the work of the coach-maker. There are three or four other species, natives of the West Indies and South America, having the same general characters as the above.

The species of Crescentia will grow in a mixture of loam, peat, and sand, and woody cuttings will grow when placed in sand in heat under a hand-glass. They do not however blossom in this country, as they require first to arrive at the full size.

(Don, *Gardener's Dictionary*; Loudon, *Encyclopædia of Plants*; Lindley, *Flora Medica*.)

CRESPI, GIUSEPPE MARIA (Cavaliere), a painter and engraver of Bologna, distinguished in his time, was born at Bologna in 1665. He was the scholar of Canuti and of Cignani, and was called Lo Spagnuolo on account of his gay attire. He was also remarkable for his perseverance in copying the works of the Carracci, Correggio, and Barroccio, and some of his copies are said to have been sold at Bologna as originals. He studied later the effect of Guercino and the composition of Pietro da Cortona. He became eventually one of the most careless and capricious of painters, though all his works exhibit great mastery; and he had a surprising facility of execution: indeed he is in this respect probably unequalled. He was however so careless, that he used any oils or colours indifferently, without investigating their properties, and in many of his works he has left the bare ground of the canvas to perform the office of a tint in the picture. Mengs terms him the destroyer of the Bolognese school. His great facility and equal success seduced the painters of his time to endeavour to obtain celebrity by similar means. There are twelve of his works in the gallery of Dresden, including the Seven Sacraments painted for Cardinal Ottoboni; and an Ecce Homo, which, with all its faults, is a most masterly performance. In colour it is rather green, but in drawing and in character it is excellent, and in boldness and security of touch surprising; it appears to have been painted in one heat, and that a short one, though it contains three half-length figures of the size of life—Christ and two Soldiers. Crespi died in 1747.

His two sons, Luigi and Antonio, followed their father's profession, but not his style. Luigi Crespi, or Don Luigi Canonico, for that is his style, is well known for his writings on art, and especially for his continuation of the 'Felsina Pittrice,' or 'Bologna Paintress,' of Count Malvasia. The count's work is in two volumes, and Crespi published a third, with the same title, in 1769. In it he has written a Life of his father, and an apology for his faults. He died in 1779.

(*Guida di Bologna*; Lanzi, *Storia Pittorica*, &c.; Bartsch, *Peintre-Graveur*.)

CRICACA'NTHUS, a genus of fossil fishes, from the mountain limestone of Armagh. (Agassiz.)

CRICO'PORA, a genus formed by Blainville out of a subdivision of the Milleporidæ, including some fossil species, which chiefly occur in the oolitic formations. C. straminea is found near Scarborough; C. cæspitosa near Bath.

CRIMINAL CONVERSATION. [ADULTERY, P. C.]

CRIMINAL LAW. [LAW, CRIMINAL, P. C. S.]

CRINOÏDEA. [ENCRINITES, P. C.]

CRINUM, a genus of plants belonging to the natural order Amaryllideaceæ. It has a tubular long perianth, with a spreading reflexed or equal limb; 6 stamens, spreading or declinate, inserted into the orifice of the tube; the ovules hardly separable from their fleshy placentæ; the capsule membranous, bursting irregularly; the seeds globose, with a fleshy testa, giving them the appearance of small tubes. The species are handsome plants, and many of them form the greatest ornaments of our gardens.

C. Asiaticum, Poison Bulb (*Radix toxicaria*, Rumph.), has a cylindrical bulb above ground; the leaves lanceolate, smooth at the edge, longer than the scape, flowers on stalked umbels; the segments long, linear, reflexed; the ovary inferior; the style as long as the stamens, declinate; the fruit membranaceous, subglobose. The bulbs of this plant are powerfully emetic, and are used in Hindustan for the purpose of producing vomiting after poison has been taken, especially that of the Antiaris. It is a native of the East Indies.

C. amabile has a very large bulb with a long red neck, the leaves broad, glaucous, smooth at the edge; the umbels many-flowered; the tube shorter than the limb. This plant is a native of the East Indies, but is now common in our greenhouses. Many of the species have been lately introduced. They grow best in a rich loam mixed with a little rotten dung. They should be potted in large pots, where they will flower abundantly. They may be propagated by suckers from the roots, or they may be raised from seed. Should the plant show any indisposition to put out suckers, it should be cut down near to the root, when it will put out plenty.

(Lindley, *Flora Medica*; Loudon, *Encyclopædia of Plants*; Herbert, *Amaryllidaceous Plants*.)

CRIOCERATITES. The discoidally spiral Ammonitidæ, whose whorls do not touch each other, receive this generic title. The species occur in the oolitic and lower cretaceous strata.

CRIO'CERIS. [EUPODA, P. C. S.]

CRITHMUM. [SAMPHIRE, P. C.]

CROCUS SATI'VUS—*Medical Properties of.* The saffron crocus is a native of Asia Minor, but extensively cultivated in the more southern countries of Europe. That which is obtained in England, chiefly from Suffolk, is from the Crocus autumnalis, and is scarcely now to be met with, being nearly quite supplanted by the saffron imported from Spain. The officinal part is the stigmata of the flower, with a small part of the style attached. The part of the style receives the name of Föminelle, and the less of this there is, the finer is the saffron. The stigma consists of three narrow club-shaped, somewhat petaloid portions, about one or two inches in length, of a brown or orange-yellow colour, with an aromatic, pleasant but somewhat stupifying odour, and bitterish aromatic taste. The plant flowers in September and October, and once a day (some say twice) the stigmata are carefully plucked out of the open flowers, and dried on paper or sieves, either in the sun, in a room, or by kilns, if the weather be unfavourable for drying in the sun. The attention necessary for procuring it in perfection may be estimated from the circumstance that nearly 40,000 flowers are required to yield one pound of saffron. The statement that 107,520 or still more [illegible] flowers are required is a gross exaggeration. The good saffron occurs only in the state called *hay*; that which is termed cake saffron is entirely composed of the flowers of a composite plant called Carthamus tinctorius, or safflower. Other sophistications are said to be practised, but they are of rare occurrence, except oiling old saffron, to give it the appearance of fresh. Portions of smoked flesh are easily detected by not yielding colour like saffron. The chemical analysis by chemists agrees as to constituents, but differs as to the respective quantities, a difference arising from the quality of the specimens examined.

	Vogel and Bouillon Legrange.	Aschoff.
Volatile oil . . .	7·5	1·4
Wax	0·5	4·0
Polychroite . . .	65·0	52·0
Gum	6·5	10·4
Soluble albumen . . .	0·5	—
Woody fibre . . .	10·0	19·0
Water	10·0	10·0
Balsamic matter, soluble in æther and alcohol . . .	—	2·0
	100·0	98·8

The volatile oil is yellow, and heavier than water, and possesses a bitter, acrid, burning taste, and is partially soluble in water. By keeping it undergoes some change, for it be[illegible] white, and is then lighter than water. To it is chiefly [illegible] the medicinal properties of saffron, while the colour [illegible] owing to the *polychroite*, which seems to be a combinati[illegible] a volatile oil and a red bitter substance.

Saffron formerly enjoyed a high repute, both as a perfume, and as a nervine, stomachic, and narcotic drug. That the odour has powerfully affected some very susceptible individuals is undeniable; but so little regard is now paid to it, that it is employed chiefly as a colouring ingredient, or adjunct to

re powerful agents. It is still a popular remedy
e eruptive stage of exanthematous diseases, a rem-
ıe old doctrine of colours; and to the same notion is
rred the practice of giving it to canary birds when
a practice reprobated by Bechstein, who judiciously
ıds iron to be put into the water at such times.
tein, *On Cage Birds*, p. 223.)

'S. [Emblements, P. C. S.]

S BILL. [Pleading, P. C.]

S REMAINDERS. [Remainder, P. C.]

VN SOLICITOR. In state prosecutions in Eng-
olicitor to the treasury acts as solicitor for the crown
ing the prosecution. In Ireland there are officers
wn solicitors attached to each circuit, whose duty it
up every case for the crown in criminal prosecutions.
paid by salaries. There is no such system in Eng-
re prosecutions are conducted by solicitors appointed
rish or other persons bound over to prosecute by the
s on each committal; but in Scotland the still better
s of a crown prosecutor in every county, who prepares
ninal prosecution whatever.

NE, JOHN, an industrious play-writer, of the
harles II., was the son of an Independent preacher
Scotia. Coming to England, and serving an old
ome time as gentleman-usher, he next became an
profession. He had the equivocal honour of being
rward by the Earl of Rochester, as a dramatic rival
; and, even after he had been cast off by his caprici-
, he retained the court favour he had gained. His
the Whigs, especially in one of his comedies, were
e rewarded by a post or pension, when he was dis-
by the king's death. The latter part of his life is
ure; but he is believed to have died soon after
le left in print seventeen plays. The tragedies,
d bombastic, are among the worst specimens of the
ste which then ruled in the drama. In the con-
of the plots they and his comedies are alike per-
d undramatic. But the comedies are his best works,
some merit in their portraiture of characters. His
dies entitled 'The Destruction of Jerusalem' were
pular when first represented; and his comedy of 'Sir
ice,' translated or imitated by him from the Spanish
of Charles II., was oftener than once reprinted.

PHORUS, from the Greek words κρύος (cold) and
φέρω, to bear, is an instrument which was invented
ollaston for the purpose of exhibiting the congela-
ter in consequence of evaporation.

sts of a glass tube about 9 inches long, bent near
tremities and terminating with hollow balls of the
rial. One of these balls is about half full of dis-
r, which being made to boil, the air is expelled, the
her with the other ball becoming filled with aqueous
n this state the tube is hermetically sealed. The
force of the vapour, by producing a pressure on
e of the water, prevents any further evaporation
ce; but, on plunging the ball containing no water
ture of snow and salt, the vapour in the balls and
denly condensed and a vacuum is produced, when
ation immediately takes place from the water, and
in two or three minutes, is converted into ice.

ACA'NTHUS, a genus of fossil Placoid fishes,
ountain limestone and old red-sandstone. (Agassiz.)

ODUS, a genus of fossil fishes, from the coal form-
Yorkshire and Lancashire, and the limestone of
se. (Agassiz.)

OID FISHES, a great division of fishes, thus
Agassiz, from the pectinated appearance of the
es of the scales, which are of a horny substance,
nor enamelled. Abundant in the actual creation,
rare as fossils in all but the more recent strata.

O'LEPIS, a genus of fossil fishes, from the oolite of
d. (Agassiz.)

ING-STOOL. [Tumbril, P. C.]

'BALUS, a genus of plants belonging to the natural
ryophylleæ. It has a 5-toothed naked calyx;
petals; 10 stamens; 3 styles; capsule a globose
erry; reniform seeds. There is but one species of
, *C. baccifer*, the Berry-bearing Campion. It differs
from the species of Silene except in its berried cap-
h is black. It is a native of Europe, and has been
d in Great Britain. It has been undoubtedly intro-
t is scarcely naturalized.
gton, *Manual*.)

CUCUMITES, a genus of fossil plants, from Sheppey. (Bowerbank.)

CULDEES, the name of a religious order in Scotland, Ireland, and the north of England, whose origin may be dated from the middle of the sixth century. The information regarding their origin is chiefly derived from the memoirs of their founder Columba. Their gradual absorption, by the spread of the Romish hierarchy in Scotland, is a subject for which the chartularies and other muniments of the episcopal sees and abbacies in Scotland provide abundant materials from which a curious history might be framed by any one possessed of sufficient industry and minute attention to pursue the subject. There have been so many etymologies of the word Culdee, and they are all so purely hypothetical, that it would be a useless effort to attempt a comparative judgment on them.

Unfortunately, the history and institutions of the Culdees have been the subject of dispute between the supporters of the Episcopal and those of the Presbyterian form of church polity; the one maintaining that this primitive body were a mere collection of monastic institutions connected with the Catholic hierarchy, while it is endeavoured to be proved, on the other side, that they were the prototypes of the Protestant Presbyterians, and that their church polity, destined to predominate in the Christian world, was derived from the fountain-head of Christian truth, and communicated to modern times through the Lollards, before the Culdees were entirely extinguished. They have in this respect been compared with the Waldenses. The Culdees undoubtedly formed a part, if not the whole of that early Scottish church, which had established a different epoch for the celebration of Easter from the Catholic church, a subject subsequently productive of much dispute between the Scottish and English ecclesiastics. The ground on which the former maintained their own peculiar usages was, that they had been derived directly from the apostles, by whom, and not by the ecclesiastical representatives of St. Peter, the church in Ireland had been planted. The practice of the Culdees seems to have so far coincided with the later monastic institutions, that they lived in retirement, practised abstinence, and made devotion and the administration of religious and charitable functions their chief pursuits. So far were they however from adopting a rule of celibacy, that marriage was practised and reckoned honourable among them. It is difficult to discover their precise polity. It has been found that they ordained bishops; but it farther appears that the persons bearing that name, instead of having any absolute authority over another class as Presbyters, were themselves under the authority of the president, or head of the establishment, as representing the community. The Culdees had establishments in various parts of Scotland, many of them in the form of colleges, where they kept small libraries of MSS. and gave instruction to youth. Their principal establishments, besides that of Iona, were at Abernethy in Perthshire, the island of St. Serf in Lochleven, Dunkeld, St. Andrews, and Monymusk in Aberdeenshire. Efforts have been made, though apparently without success, to identify these establishments with the episcopal dioceses, and to prove that each college or monastery, with its head and ordinary members, was virtually the dean and chapter of the diocese. The archiepiscopal see of St. Andrews appears to have owed its early predominance to the Culdees, who seem to have had considerable possessions in the neighbourhood. The great abbey of Arbroath is believed to have had a similar origin, and so is that of Melrose. Besides the dispute as to the holding of Easter, and the difference of opinion on the marriage of ecclesiastical persons, the Culdees had many subjects of dispute with the Romish hierarchy, from whose customs they seem to have diverged on the subject of auricular confession, and various others. They were at last obliged to give way before the waxing influence of the Church of Rome. St. Bernard describes the people as beasts and barbarians, who 'neither pay tithes nor first fruits. They do not enter into lawful marriage, they do not go to confession: no one can be found who applies for the prescription of penance, nor any one who will prescribe it.' The erection of the several bishoprics, under the patronage and countenance of the kings of Scotland, raised up powerful enemies to the Culdees who were within the respective territories allotted to them as dioceses; and the order was thus gradually incorporated with the Roman Catholic church.

(Jamieson, *Historical Account of the Ancient Culdees of Iona, and of their Settlements in Scotland, England, and Ireland*.)

CUMBRIAN ROCKS. Professor Sedgwick has given this term to the lowest series of slaty rocks which appear in the ranges of Skiddaw and Grasmoor Fell in Cumberland. They lie below the green slaty rocks of Scafell and the Old Man, which the same writer regards as coeval with the strata of Snowdon, and ranks under the title of Cambrian.

CUNE'GO, DOME'NICO, a distinguished Italian engraver, and one of the best of the eighteenth century, was born at Verona in 1727. He commenced to study as a painter under Francesco Ferrari, but he found engraving more suited to his taste, and, at the age of eighteen, he adopted it as his profession. He was particularly well qualified in one respect, as he was a correct draftsman, and was accordingly enabled himself to make, from the pictures he engraved, the drawings from which he worked. Cunego settled in Rome in 1761, where his first works were a series of Roman Ruins after Clerisseau, for the Count Girolamo dal Pozzo. In 1773 Gavin Hamilton published his 'Schola Italica,' of which the best and the greater part of the plates were engraved by Cunego. He engraved twenty-two, including the three creations—of the water, of the sun, and the moon, and of Adam, from the frescoes of Michael Angelo on the ceiling of the Sistine Chapel; La Fornarina of Raphael, from the Barberini portrait; and Galatea, from the fresco of Raphael in the Farnesina. The others are from Giorgione, Titian, the Carracci, Domenichino, Guido, and other celebrated painters.

In 1785 Cunego was invited to Berlin to superintend an Engraving Institute (Kupferstich-Institute), which was established by a merchant of the name of Pascal; but after a trial of four years the undertaking was abandoned, and Cunego returned in 1789 to Rome. He however executed a great many plates, chiefly portraits, during his sojourn in Berlin, including several mezzotint and line portraits of Frederic II. and the royal family of Prussia, after E. F. Cunningham, a Scotch painter, then in repute at Berlin. Cunego engraved eleven mythological subjects after Gavin Hamilton, besides numerous other works, religious and profane, after various masters. He engraved also an outline of the great fresco of the Last Judgment, by Michael Angelo, in the Sistine Chapel. He died at Rome in 1794. Cunego's execution, as far as respects the mere line, was not the most perfect, but his style was light, elegant, and correct; and he is considered by some critics to have been the best historical engraver in Italy of his immediate time: he was however latterly surpassed by his junior and rival Volpato. His two sons, Aloisi and Giuseppe, likewise practised engraving with success.

(Gandellini, *Notizie Istoriche degli Intagliatori*, &c.; Huber, *Manuel des Amateurs*, &c.; Goethe, *Winckelmann und sein Jahrhundert*; Ticozzi, *Dizzionario degli Architetti*, &c.)

CUNNINGHAM, JOHN, the son of a Scotchman settled at Dublin as a wine merchant, was born there in 1729. An ill-judged passion for the stage tempted him away from home at an early age. His father afterwards became insolvent; and a pride not discreditable to him forbade him to return and be a burden on his family. Accordingly he continued, during his short life, to pursue the precarious career of an itinerant player. For a good many of his later years he was chiefly employed at Edinburgh and in the north of England, where his personal character was highly respected. He was the author of a farce now quite unknown, and of several small volumes of poetry, chiefly pastoral, whose sweetness has obtained for some of them a corner in popular collections, and entitles their author to a place in the list of minor English poets.

CUNNINGHAM, ALLAN, was born at Blackwood in Dumfriesshire, in 1785, of parents in very humble circumstances, though not of humble descent, as one of his ancestors lost the family patrimony in Ayrshire by taking the side of Montrose in the time of the Commonwealth. 'His father,' says Allan Cunningham, 'was a man fond of collecting all that was characteristic of his country;' an inquiry which the son appears to have prosecuted, if not with more zeal, at least with more effect. Young Allan was taken away from school at the early age of eleven, and was bound to a stonemason. Hogg gives us some account of Allan's appearance and character in early life, in his 'Reminiscences of Former Days;' he describes him at the age of eighteen as 'a dark ungainly youth, with a broadly frame for his age, and strongly-marked manly features, the very model of Burns, and exactly such a man.' Hogg continues, that young as Allan Cunningham then was, he had heard of the name, and he thought he had *seen one or two of his juvenile pieces.*

In 1810 he came to London, and his name first appeared in print at the same time, as a contributor in the c
Cromek's 'Remains of Nithsdale and Galloway S
collection, purporting to be Nithsdale and Gall
was entirely recast and much of it written by
ningham, and Hogg states that when he first sa
he perceived at once the strains of Allan Cunnin
cially in the 'Mermaid of Galloway,' from the p
his style, which he had already noticed, and he adds
Cunningham was the author of all that was bea
work.' Hogg wrote a review of it, and sent it to J
after retaining the review for some time, returne
note saying, that he had read over the article, an
vinced of the fraud which had been attempted to
off on the public, but that he did not think it wo
posure.

For some time after his arrival in London, Alla
ham maintained himself by reporting for newspape
tributing to periodicals, especially the 'London
to which he was one of the principal supports.
period, the situation which he obtained in Chantr
as foreman or principal assistant in working the
abled him to prosecute his literary taste without ha
following are his chief works: 'Sir Marmaduke
drama; 'Paul Jones,' and 'Sir Michael Scot,' nov
of Scotland, ancient and modern, with Introductio
Historical and Critical, and Characters of the Lyr
vols. 8vo. 1825; 'The Lives of the most emin
Painters, Sculptors, and Architects,' in 'Murray
Library,' 6 vols. 12mo., 1829-33; the Literary
to Major's 'Cabinet Gallery of Pictures,' 1833
Maid of Elvar,' a poem; 'Lord Roldan,' a roma
Life of Burns;' and 'The Life of Sir David Wilk
8vo. 1843, a posthumous publication. Allan C
died on the 5th of November, 1842, aged fifty-sev

To appreciate duly the songs of Allan Cunnin
bably requires a man to be of Scotch origin: he
have been valued by his literary contemporaries o
by Sir Walter Scott, and particularly by the Et
herd. Hogg, after recounting his first meeting wit
'I never missed an opportunity of meeting with
it was in my power to do so. I was astonished a
riousness of his fancy. It was boundless; but
luxury of a rich garden, overrun with rampant
was likewise then a great mannerist in expressi
man could mistake his verses for those of any oth
remember seeing some imitations of Ossian by hi
thought exceedingly good; and it struck me that
composition was peculiarly fitted for his vast
imagination.' His 'style of poetry is greatly cha
for the better. I have never seen any style i
much. It is free of all that crudeness and man
once marked it so decidedly. He is now unifor
serious, descriptive, or pathetic, as he changes
but formerly he jumbled all these together, as i
cauldron, and when once he began, it was impossi
culate where or when he was going to end.'

Allan has had however his English admirers a
the foremost of these was Miss Landon, concern
and a few others of his associates, some interesting
peared in the Britannia newspaper shortly after hi
November, 1842. Flaxman also, according to Cu
own account, must be numbered among his Englis
as appears from what Cunningham says in his Life o

Allan Cunningham is however better known i
and abroad for his 'Lives of the Painters,' &c. th
poetry. This popular work contains memoirs of
Wilson, Reynolds, Gainsborough, West, Barry, Bl
Morland, Bird, Fuseli, Jamesone, Ramsay, Rom
ciman, Copley, Mortimer, Raeburn, Hoppner, O
low, Bonington, Cosway, Allan, Northcote, Sir G.
Lawrence, Jackson, Liverseege, and James Burnet,
of Gibbons, Cibber, Roubiliac, Wilton, Banks,
Bacon, Mrs. Damer, and Flaxman, sculptors; and
of Wykeham, Inigo Jones, Wren, Vanbrugh, Gib
Earl of Burlington, and Sir W. Chambers, archit
work is popular not on account of the execution of
but on account of the subject; to those however
rested in the subject it is invariably unsatisfacto
lives are not impartially written, facts are not in
statements are made without any reference to
anecdotes are recast to suit the author's taste; an
its chief merit is that of an easy, fluent, and for
The less satisfactory lives are those of West, Bl

useli, Jamesone, Cosway, Northcote, Wilton, and Bacon: some of these there is the occasional appearance of a spirit malevolence, evident enough to force itself into notice: his yle is also frequently contemptuous; whether this was his isfortune or his fault those who knew him can best decide. ven his most lauded life, that of Blake, has given little satis- tion to Blake's friends; the editor of a new edition of ake's 'Songs of Innocence and of Experience,' in 1839, says, his preface and biographical notice, 'Though we have dly availed ourselves of Mr. Allan Cunningham's facts, have been sedulous to exclude from our pages his tone of ling, and style of thought, in speaking of Blake.' Again, s the writer, 'That Sense and Self are realities; that God, Nature, and our fellow-men, are current terms,—whence inating or how disposed of it matters not,—has been esta- hed, on the basis of Doubt, by David Hume; and has n carried out into some of the details requisite for making to a 'System of Philosophy,' by Thomas Brown and ald Stewart. Behold, then, in the 'Lives of British ters,' the application of the system to art and the souls rtists. He who has thus applied it possesses eminently qualifying power of transmuting things into words; and just such words as imply a negation of the things they for.'

ssavant also, in his work on England, 'Kunstreise durch land,' &c., in noticing Allan Cunningham's 'Lives,' ob- es, 'This work contains several errors, and displays a ensity for relating all sorts of often demeaning and om founded anecdotes,' p. 346.

he following few quotations from the work itself will serve art to justify these censures, though they are a very small ion of the passages that might be adduced. Of West ays, 'He was the first and last President of our Academy found spelling a difficulty;' of Wilton he says, 'As one is enough to make a man king among the blind, Wilton uphed over all his fellows;' of Bacon he says, 'He was cha- ble, at least in theory; to resolve to do a benevolent act, cates a man who can take one step, at least, in the road of cy; and it may be the fault of the reporters that I have d oftener of his theory than of his practice.' Of North- several such passages might be quoted. His general re- ks of the kind are perhaps more numerous than his special s, as the following in the Life of Owen: 'Art has not yet ome with us a fashionable profession for the gentleman and olar: certain neglect now, and an indifferent memoir here- r, are no inducements for the polite and the rich to take the brush or the chisel; and the consequence is, when e thins the ranks of the Academy, the vacancies are sup- ed by the chance children of genius, who have come from plough, the manufactory, or the shop, to assert the truth the great principle of nature, that talent, like sunshine, ds its light on all conditions. Such is the story of most of first-rate artists.' This is true of some, but not of 'most ur first-rate artists.'

CUPRESSINITES, a genus of fossil plants, from Sheppey, ntaining thirteen species. (Bowerbank.)

CUPRESSOCRINITES, a genus of Crinoïdea. (Gold-)

CURCU'LIO, a genus of insects founded by Linnaeus for h tetramerous Coleoptera as have club-shaped antennæ rted on a prolonged rostrum. In the twelfth edition of 'Systema Naturae,' ninety-five species are enumerated. progress of entomology has converted the genus as de- d by its founder into a family including several thousand s, though the original name is retained for a few South rican beetles, of which *Curculio splendidus* is the type.

The family of *Curculionidae*, as at present constructed, has made the subject of special research on the Continent M. Schoenherr, and in England by Mr. Walton. The r entomologist has published a work, as yet incomplete, tled 'Genera et Species Curculionidum,' in which no er than 4089 species, distributed through 404 genera, e been already described, and as many more remain for ription.

For notices of the habits of these insects, see Weevil, P. C.

CURCUMA, a genus of plants belonging to the natural er Zingiberaceæ. It has the tube of the corolla gradually larged upwards; the limb 2-lipped, each lip 3-parted; the gle filament broad; the anther incumbent, with two spurs the base; the style capillary; the capsule 3-celled; the ds numerous, arillate. The species are stemless plants with rose roots; the flowers are of a dull yellow colour, sur- nded by bracteolæ.

C. Zerumbet, Zedoary, has lateral spikes, the tubers palmate, pale straw-coloured; the leaves from 4 to 6 together, with a long somewhat winged petiole, with a dark purple cloud running down the centre; the flowers shorter than the bracteolæ; the embryo truncate, nearly as long as the seed, the upper half lodged in the vitellus, the lower half in the perisperm. This plant is the *Zedoaria longa* of the shops, and has the same property as the following species. It is a native of the East Indies and Java.

C. Zedoaria, Broad-leaved Turmeric, has the spikes lateral; biennial tubers which are yellow internally; the leaves petioled broad-lanceolate, entire, underneath covered with soft sericeous down. This is the *Zedoaria rotunda* of the shops. Fée has confounded this plant with *Kæmpferia rotunda*, which has no sensible properties resembling the plant in question. The tubers of this plant are aromatic, and are used by the Hindus not only as a stimulating condiment and a medicine, but as a perfume. Its sensible properties are very like those of ginger, but not so powerful. It is employed in the East in cases of disease, as colic, cramp, torpor, &c., where stimulants are indicated. The Zedoary is used under the same circumstances. The roots of both these plants are imported into Europe, but are not used extensively. *C. Zedoaria* is a native of Bengal, China, and various other parts of Asia, and of the Asiatic Islands.

C. rubescens has lateral spikes, the tubers pearl-coloured inside; the leaves bifarious, broad-lanceolate, cuspidate, smooth, strongly marked with parallel veins, of a uniform dark green with the nerves or ribs red, 12 to 24 inches long, 5 or 6 broad; the scapes invested with several dark reddish sheaths. It is a native of Bengal. All the parts of the plant have a pleasant aromatic smell when the plant is bruised. The pendulous tubers of this and several other species of Curcuma yield starch, and are employed by the natives for preparing arrow-root. In Travancore it forms the principal diet of the natives.

C. Amada, Mango Ginger, has few-flowered central spikes; the tubers horizontal, palmate, of a deep orange colour inside; the leaves radical, bifarious, petioled above their sheaths, lanceolate cuspidate, smooth on both sides, from 6 to 18 inches long by 3 to 6 broad. This plant is a native of Bengal, and is called by the Bengalees 'Amada.' It is called mango ginger because the fresh root has the smell of a mango. It is used for the same purposes as ginger.

C. leucorhiza grows in the forests of Bahar, where it is called 'Tikor.' It has remarkably long tubers, often a foot in length, of a pale yellow inside, and they produce an excellent arrow root.

C. angustifolia, with stalked narrow lanceolate leaves, is a native of the forests of India from the banks of the Lona to Nagpore. Its tubers, which are found at the end of fleshy fibres which meet together forming a crown, yield an excellent arrow-root, which is that met with in the markets of Benares.

C. longa, the common Turmeric, is cultivated all over India, and is used as a condiment, and for dyeing. [Curcuma longa, P. C.]

There are several other species of Curcuma, but the above are those which yield aromatic oils and starch in greatest abundance.

(Lindley, *Florica Medica*; Loudon, *Encyclopædia of Plants.*)

CURCUMA LONGA, *Medical Properties of.* This perennial plant, belonging to the tribe Zingiberaceæ, is not ascertained to be native of any particular country in the East; it is occasionally wild, and it is also extensively cultivated in China, Java, Malacca, and in Bengal, prospering in a moist but not swampy soil. The mode of culture is described in P. C. viii. p. 233. The Chinese sort is most esteemed, rather on account of its superior richness in colouring matter than from any other cause. Two varieties are found in commerce, the round turmeric (Curcuma rotunda) and long turmeric (C. longa). These are generally regarded as the produce of the same plant; but even were they yielded by two, it is altogether incorrect to assign the round to Curcuma rotunda, Linn., which is the Kœmpferia ovata, Roscoe, a rare plant, the root of which is destitute of any colouring principle. The name is derived from the Persian kurkum, which means saffron; hence it is sometimes termed Saffran des Indes, but must not be confounded with common saffron, from Crocus sativus. It is likewise called by the French Terra merita (Curcuma, haec Gallis Terra merita male dicitur), see Royle, 'Antiquity of Hindoo Medicine,' p. 87.

Round turmeric occurs in knobs, roundish, ovate, or oval, sometimes pointed, and insensibly running into the long turmeric, and is of a deeper, more camboge-like colour in the interior. The pieces are from one to two inches long, and nearly one in diameter. The long turmeric occurs in pieces about two inches long, either straight, or curved, and doubled up, presenting on the surface more marks whence the root-fibres have sprung. The colour externally is of a brownish yellow, internally lighter than that of the round sort. The fracture has a waxy appearance, and the odour is unctuous. The taste is bitterish, aromatic, and like ginger, but less potent. 'In the fresh state it has a rather unpleasant smell, somewhat resembling cerate, which goes off a good deal on drying.'—Ainslie's Mat. Indica. This article is very liable to be eaten by small beetles. Old, worm-eaten specimens should be rejected. Hard compact pieces, which with difficulty can be powdered, are best. It has been analysed by John, and subsequently by Vogel and Pelletier:—

John's Analysis.		Vogel and Pelletier's.
Yellow volatile oil	1	Acrid volatile oil.
Curcumin	10 to 11	Curcumin.
Yellow extractive	11 to 12	Brown colouring matter.
Gum	14	Gum (a little).
Woody fibre	57	Starch.
Water and loss	7 to 5	Woody fibre.
		Chloride of calcium.
Turmeric	100	

The colouring matter is given out very freely to water, and alcohol, but curcumin in a pure state can only be obtained by digesting the alcoholic extract of turmeric in aether
porating the aetherial tincture to dryness. Its
in the mass is brownish yellow, but when powd
yellow. It is tasteless, odourless, almost insoluble
but readily soluble in alcohol and aether. The alk
it reddish-brown, and readily dissolve it. The al
lution evaporated with boracic acid, becomes red
chloric acid also reddens it. The alcoholic solu
cumin produces coloured precipitates, with several
as acetate of lead and nitrate of silver (Pereira).
quent use of turmeric as a test renders a knowledg
points necessary. (See Fresenius, 'Chemical An
Bullock, p. 31.)

Turmeric has aromatic qualities which render
languid habits, where digestion is difficult, and the
slow. The repute it enjoyed as a cure for ja
dropsies was founded on the doctrine of signature
'Mat. Med.,' i. p. 25). It is of some importanc
but it is as a condiment, both in the East and in th
that it merits notice, as it is an ingredient in all cur
and *curry pastes*. When in excess the colour is
and one flavour predominates, which is contrary to so
law. The same observation applies to Cayenne pepp
us, turmeric and Cayenne pepper prevail in th
powerfully.'—Acton's 'Modern Cookery,' p. 287.
lowing table, extracted from the 'Pharmaceutica
vol. iv. p. 364, supplies an infinite variety of recei
paring curry powder. But whichever is preferred
added to it some *mushroom-powder*. The me
whatever article is employed as the basis of the curry should always be so perfectly boiled that it can be eaten with a spoon. This necessarily destroys the natural flavour of the meat. The mushroom-powder contains *osmazome*, the source of flavour in meat, and consequently it restores what the long cooking has dissipated. The curry-powder should not be added to the dish till a few minutes before it is to be served to table. [Food, P. C.]

	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.	O.	P.	Q.	R.	S.
Turmeric	4oz.	2oz.	3oz.	5oz.	6oz.	2oz.	8oz.	6oz.	8oz.	3oz.	2oz.	8oz.	6oz.	4lb.	3oz.	8oz.	2½oz.	8oz.	3oz.
Coriander Seeds	8	6	1	3	1	1	2	13	2	4	2	16	6	4	6½	4	1½	2	[illegible]
Ginger	3	½	1	1	1	2	2	..	..	2	2	..	..	1	1	..	½	2	..
Cinnamon	½	2dr.	..	..	¼	..	..	..	½	..	..	..	..	..	1½	..	..	..	..
Cassia	..	..	..	..	..	..	..	..	2	..	..	..	..	2oz.	..	..	..	..	3dr.
Cardamoms	¼	..	1	1	..	½	1	..	..	2	½	..	..	4	..	..	½	..	½oz.
Grains of Paradise	..	..	..	..	..	..	..	..	1	..	..	..	2	..	..	..	..	..	..
Chillies	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Caraways	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..
Cayenne	..	6	¼	1	½	½	1	1	½	2	½	1½	½	1lb.	½	½	½	1	6dr.
Black Pepper	1½	½oz.	..	1	4	..	2	2	1	1	..	1½	1	..	2½	..	½	..	2oz.
Mace	..	1dr.	..	¼	..	..	..	..	2dr.	..	..	..	..	1oz.	..	..	½	..	..
Fœnugreek	..	1½oz.	¼	..	1	..	..	..	..	..	..	2	..	..	1	2	..	1	1
Cummin	2	..	½	..	1	½	2	3	..	..	½	..	..	..	..	2	..	1	4
Pimento	..	2dr.	..	..	..	..	..	..	..	..	..	..	..	1lb.	1	..	..	..	2dr.
Cloves	..	1	..	..	..	..	..	..	½oz.	..	..	..	..	1oz.	2dr.	..	..	½	2
Nutmeg	..	½oz.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
White Pepper	..	..	1	..	..	1	..	..	..	..	1	..	..	..	..	..	..	1	..
Scorched Mustard	..	..	..	2	..	..	..	..	..	3	..	..	..	..	..	..	1	..	..
Lemon Peel, in powder	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..

CURIA MURIA, or better, KOORYA MOORYA ISLANDS, are situated on the southern coast of Arabia, and afford protection to an open bay called Koorya Moorya Bay, which is extensive, and has good soundings throughout. They lie in the direction of the eastern continuation of Rass Noss, a very elevated headland, and lie between 55° 20′ and 66° 10′ E. long., and near 17° 30′ N. lat. They are five in number, called from west to east Hasik, Soda, Hallanny, Karzawet, and Jebeliya. A long reef is said to extend from Hallanny to Soda, so as to render it very dangerous, if not impossible, for any vessel to pass between them; but between Soda, Hasik, and the main land, the channels are good. Hallany, the only island that is inhabited, contains twenty-three individuals: the anchorage and village are at the northern extremity, where water may be obtained, but it is brackish. Its mountains are high, and apparently of volcanic origin.

(Captain Owen, *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar*; Dr. Hutton's 'Account of the Curia Muria Isles,' in *London Geographical Journal*, vol. xi.)

CURRANT. [Ribes, P. C.]

CURRYING. [Leather, P. C. S.]

CURSITOR BARON, an officer of the Court of Exchequer, is appointed by patent under the great seal to be one of the barons of the Exchequer. He attends at Westminster to *open the court* prior to the commencement of each of the four terms, and on the seal day after each term to clo
He administers the oaths to all high-sheriffs and u
who are sworn by the court, and to several officers
Prior to 1833 he had various other duties to p
since the passing of the act 3 & 4 Will. IV. c.
the business of his office has entirely ceased; an
missioners appointed under the 1 Will. IV. c. 58,
on the consolidation of the offices in the Courts
Bench and Common Pleas, recommended the abol
office of cursitor baron. This recommendation, h
not been carried into effect. (*Report of Commi*
Offices of Courts of Justice, 1822; *Parl. Pape*
Parl. Paper, 1835, No. 314.)

CURVE. In the article Curve, P. C., a list
given, for which reference is made to their seve
As one or two of these have been omitted or mi
insert the present article to supply deficiencies. T
at the head of each paragraph refer to the list just

5. *Semicubical parabola.* The term *parabola* h
tended to mean any curve having an equation of
$y=ax^m$, where m is positive. Thus $y=ax^3$ is
parabola, and $y=ax^{\frac{3}{2}}$ is the semicubical parabola.
cubical parabola is the evolute of the common para

8. *Trisectrix.* See this curve described in T
P. C., and figured in Trochoidal Curves, P. C.,

11 and 12. For the *Companion to the Cyclo*
cloid, P. C. The harmonic curve, so called beca
portion of it, is one of the simplest forms assume
brating string, has for its equation the relation betw
y implied in

$$x=a\theta \qquad y=b(1-\cos\theta).$$

12 to 17. These curves are all described in T
Curves, P. C.

20 to 24. See Spiral, P. C.

als of Cassini. Dominic Cassini (see James Cas- *onomy*, vol. i. p. 149) proposed, as a better repre- of the planetary motions than the ellipse, a curve in rectangle of the distances from any point in it to foci is constant. This curve is of the fourth order, e one oval, a lemniscate form, or two separate ovals, to the ratio of the given rectangle to the square on e between the foci. It is hardly necessary to say ni was wrong in his application of this curve: but ity of his name has kept his oval or ovals among the ich serve for exercise to beginners.

att's Parallel Motion Curve. The end of the beam -engine describes an arc of a circle; but it is required nd of the piston-rod, which must be in some way it, should describe a straight line, or a curve which rly a straight line. Now at and near a point of exure the arc of a curve is very nearly straight. If evolve round fixed pivots, their ends being con- a third rod, the middle point of that third rod will curve which has a point of contrary flexure; and if s of the rods be properly taken, and if one of the e beam of the steam-engine, the reciprocating rota- n of the beam may be made to communicate what is a reciprocating rectilinear (improperly called pa- ion to the middle point of the third rod, on account described by that middle point containing the point r flexure. A piston therefore may be attached to point of the third rod, and the requisite condition lly satisfied. The apparatus described in STEAM- P. C., p. 477, and in Lardner's 'Steam-engine,' 1, consists in the addition of a pair of rods which rst and third compose a parallelogram moveable at s. This is intended to furnish the same recipro- ilinear motion to a second piston placed at the new h is nothing to our present purpose. Watt's pa- on curve must be defined as the locus of the middle straight line of given length, the ends of which de- of circles.

owing considerations on the definition of the word be useful to the young analyst:—

rically speaking, a curve is described by a point es according to one uniform law, and does not de- aight line. An oval, for instance, formed by arcs n the manner described in books on mensuration, is , but a junction of several arcs of different curves: he two branches of an hyperbola cannot be said, in ive view of the subject, to be anything but two cordingly they *were* called opposite hyperbolas.

ebraically speaking, the meaning of the word curve tended. Every curve, just defined, has one per- uation connecting the abscissa and ordinate of every The converse is made true by extension of the of the word *curve*. All the points whose co-ordi- fy an equation constitute the curve to which the said to belong. Let x and y be the abscissa and a point; and $\phi(x, y) = 0$, the equation which is them. If this equation be satisfied when $x=a$ and point whose co-ordinates are a and b is considered ase as belonging to the *curve* whose equation is . The consequence is that a curve, or what is so lgebra, may be either the simple curve of geometry ection of such curves formed under algebraical mo- of one law—or a collection of such curves not even lly connected—or an isolated point—or a collection points at finite distances from one another—or a of isolated points infinitely near to one another, but ertheless cannot be considered as forming one con- anch of an ordinary curve. Or it may be any com- f two or more of these. We give some instances, as

equation $y-m^2x^2=a^2$ belongs to both the branches erbola. If a change, m remaining constant, the becomes a different hyperbola, with the same asym- efore. But if $a=0$, the equation belongs simply to asymptotes, that is, to two distinct and independent es. In like manner the equation

$$(x^2+y^2)(x+y)=x^2+y^2+x+y-a$$

a complicated curve, with various branches. But is curve resolves itself into two distinct curves, the ne $x+y=1$, and the circle $x^2+y^2=1$. For the an then be reduced to

$$(x^2+y^2-1)(x+y-1)=0$$

atisfied whenever either $x^2+y^2-1=0$ or $x+y-1=0$ is satisfied. If a, instead of being $=1$, is only very near to 1, the curve approaches very near to the circle just mentioned throughout, and, except for great values of x, also to the straight line.

2. The equation

$$(x-a)^2+m(y-b)^2=0$$

belongs to a distinct pair of straight lines when m is negative. But when m is positive, it belongs to nothing but the point whose co-ordinates are a and b.

3. The equation

$$y=ax^2+\sin x . x^{\frac{1}{2}}$$

belongs to a branch with an infinite number of intersecting convolutions, when x is positive: but when x is negative, it belongs to nothing but an infinite number of isolated points, situated at finite distances from each other on a parabola.

4. If $y=a^x$, a being positive, there is a continuous branch in which there is a positive ordinate for all values of x. There can be no negative ordinate except for values of x which have, when in their lowest terms, odd numerators and even denominators. But between any two values of x can be interposed an infinite number of such fractions. There is then a branch of the curve which, though it may be said to contain an infinite number of points, infinitely near together, cannot be called continuous. For there is no negative value of y when x is a fraction which has an even numerator and an odd denominator. These *pointed branches*, as they have been called, have only been recently considered. Their admission depends entirely upon definition. Those who would restrict the meaning of the word curve to something like its antient signification, will reject them: but those who wish to look upon a curve as a tabulation in space of every possible value of x and y which will satisfy a given equation, must admit them. The few hints here given on the extension of the word curve are meant to excite the curiosity of those who have not been accustomed to look at geometrical interpretation as subordinate to algebra.

CUSCO-CHINA, *Medical Properties of.* This bark, which was first distinguished from the common cinchona barks by Jobst, comes from Cuzco in Peru, but the tree which yields it is altogether unknown. It is considered by some to be the same bark as the Arica bark, but this also is doubtful. That it is not the same as the Cinchona rubiginosa of Bergen, though so called by Leverköhn, is certain. In general attributes it approaches the yellow (calisaya) barks, but it differs from all heretofore described, in the chemical characters of the alcaloid it contains. This is termed Cusco-cinchonia, or Cusconina, but it is improper to consider Aricina as synonymous with it, since it is by no means certain that Arica bark and the one now described are identical.

The alcaloid is procured by the same process as is used for cinchonia, which it resembles in its physical qualities, but differs in its chemical habitudes. The taste is more bitter, rather heating, and sub-astringent. It is equally insoluble in water, but easily so in alcohol and in sulphuric aether. It forms with acids salts which resemble those of cinchonia, but have a more bitter taste. The sulphate conducts itself singularly. A concentrated watery solution of this salt forms on cooling a tremulous jelly, which on drying becomes horny, but which, by the assistance of boiling water, resumes the jelly-like state. Cinchonia, quinia, and cusconia are supposed to be one base or radical with progressively increasing proportions of oxygen.

The formula of these is

$(\mathrm{C}4^{\circ}\ \mathrm{H}24\ \mathrm{Az}^2) + \mathrm{O}$ cinchonia.
$(\mathrm{C}4^{\circ}\ \mathrm{H}24\ \mathrm{Az}^2) + \mathrm{O}^2$ quinia.
$(\mathrm{C}4^{\circ}\ \mathrm{H}24\ \mathrm{Az}^2) + \mathrm{O}^3$ cusconia.

This composition renders it worthy in the highest degree of the attention of medical men. The warmth which it excites points out the propriety of giving it in cold intermittents, and low typhoid states of the system.

CUSPA'RIA. [GALIPÆA, P. C.]

CUSTOMARY FREEHOLDS. [COPYHOLD, P. C. S.]

CUSTOMS' DUTIES. [TARIFF, P. C. S.]

CUSTOS BRE'VIUM. Officers so called existed until lately both in the Court of Queen's Bench and the Court of Common Pleas. They received and had the custody of all the writs returnable in their respective courts, filed warrants of attorney, and various other documents connected with the business of the courts. By virtue of the act 1 Will. IV. c. 58, these offices (of which the duties were performed by deputy) were abolished in both courts, and compensation granted to their possessors. The office in the Court of Queen's

Bench was held by Lords Kenyon and Ellenborough jointly, and the compensation granted them was 2089*l.* 17*s.* 4*d.* per annum. In the Court of Common Pleas the compensation granted to the custos brevium was 606*l.* 10*s.* 6*d.* per annum. (*Parl. Papers*, 1835, No. 314; 1844, No. 413.)

CUSTOS ROTULO'RUM is the chief civil officer of the county, to whose custody are committed the records or rolls of the sessions. He is always a justice of the peace and quorum in the county for which he is appointed. The lord-lieutenant has the chief military command of the county, and his office is quite distinct from that of custos rotulorum; but it is the invariable practice to appoint the same person to both offices, in whom is united the highest military and civil authority within the county. By statute 37 Hen. VIII. c. 1, and 1 Wm. III. c. 21, he is appointed under the queen's sign manual. As he has the custody of the rolls of the sessions, he should attend there in person or by deputy; and this duty is performed by the clerk of the peace as his deputy. [CLERK OF THE PEACE, P. C. S.]

(Blackstone, *Comm.*; Burn, *Justice of the Peace*; Dickinson, *Guide to Quarter-Sessions.*)

CUTTING AND STABBING. [MAIM, P. C.]

CUYP. [KUYP, P. C.]

CYANOGEN, CHLORIDE OF. [CHEMISTRY, P. C. S.]

CYANOMETER, from the Greek works κυανός (blue) and μέτρον (a measure), is an instrument which was invented by M. de Saussure for the purpose of enabling an observer to ascertain the intensity of colour in the sky.

It is well known that the visible heavens, when free from clouds, appear to have a blue tint which gradually increases in intensity from the horizon towards the zenith, that the blueness is more intense by night than by day, and that on the tops of mountains the colour is sometimes so deep as to be almost black. These appearances depend partly on the different extents of atmosphere which the rays of light have to pass through, and partly on the quantity of water which the air holds in solution. When, as towards the zenith, the atmospheric space traversed by the light is comparatively small, the violet and blue rays are transmitted to the earth in abundance; while, towards the horizon, the spaces passed through being greater and being charged with vapours, the violet, the blue, and even the green rays are intercepted, the remaining colours only of the spectrum being transmitted: it must, however, be added that the colour of the sky is affected by the terrestrial particles which are occasionally raised in the atmosphere; and also by the reflexions of light from terrestrial objects, particularly from naked rocks and from masses of snow or ice. The colour of the sky being thus, in some measure, an indication of the state of the atmosphere with respect to exhalations and the reflexions of light from the earth's surface; it is of importance to ascertain with some precision the intensity of that colour.

The Cyanometer, as formed by the inventor, consists of a circular plate or ring, of metal or pasteboard, on the surface of which, about the circumference, is a band divided by radii into fifty-three equal compartments. One of these is white, and those which follow in succession are coloured with blue of different degrees of intensity from the most faint to the deepest which can be produced; the rest of the compartments are coloured with mixtures of Prussian blue and ivory-black, and gradually increase in darkness to the last division, which is quite black.

In using the instrument, the observer, who should be in the open air, holds it up between himself and that part of the sky at which he intends to ascertain the colour; and this part should be such that, while the face of the instrument is strongly enlightened, the direct rays of the sun may not fall upon it: on turning the plate or ring in its own plane, till there is brought directly before the part of the sky that compartment which, to the eye, appears to be exactly equal to it in intensity of tint; the number of the compartment will express the required intensity of the blue colour in that part of the sky.

In order to form a scale of numbers for the tints M. de Saussure placed against a wall a piece of white paper, on which was a circular black spot, about one-seventh of an inch in diameter, and receded from it till the spot ceased to be visible: he then laid on paper a tint produced by Prussian blue, so diluted that, at a distance from it equal to that at which the black spot became invisible, the tint could not be distinguished from a perfect white. This tint was marked No. 1. The next deeper colour was produced by diluting the Prussian blue till, at an equal distance, the tint ceased to be distinguished from that of No. 1, the latter being near the eye: this was marked No. 2; and each of the
numbers up to No. 53 was determined in like man
comparison of the corresponding tint with that w
ceded it on the plate.

CYANURIC ACID. [CHEMISTRY, P. C. S.]

CYA'THEA, a genus of plants belonging to th
order of Ferns. The sori are globose, situated upon
veinlet, or in the axil of a fork of the vein; the recep
vated, globose, or columnar; the involucre globose,
membranaceous, or somewhat horny, at first entire a
ing the whole sorus, afterwards bursting from the t
nearly circular opening, becoming cup-shaped, mo
entire, or laciniated, or lobed; the veins pinnate, s
forked, free. (Hooker.) The species are arborescent
trunks are often beautifully marked with the scars of
fronds. The fronds are simple or pinnate, or deco
pinnate. The stipes is frequently aculeated. Th
of this extensive genus of Ferns are found most h
veloped in tropical climates. They give a peculiar
the vegetation of many districts of South America,
mens have been brought from the forests of Brazils, t
tains of Mexico and Peru, from the islands of the
Western, and Southern Oceans, and from the South
and the interior of India and China. Sir William
in the 'Species Filicum,' enumerates about forty
species. They are difficult to determine when b
this country. 'They have,' says Sir William Hook
rescent trunks whose appearance, and even external
only known to travellers who have the privilege
them in their native soils. The fronds, gigantic in
and large in all, seldom reach us in an entire state.
but little acquainted with the stipes, whether it b
or aculeated, or with any other character which
marks of distinction. The shape or outline of the e
we have rarely the means of ascertaining: nor do
what is the exact nature of its composition, nor th
be put upon the more or less downy or scaly cove
pinnæ, or the greater or less breadth of the pinnæ, o
or segments, or the more or less deeply serrated
Hence, too, their synonymy becomes inextricable;
out the opportunity of examining authentic sp
authors, their species in many instances must be lo
as doubtful. The difficulty is increased by the old
not considering the nature of the fructification no
tion, so that in few herbaria do we find the most
and, we presume, the original species, the one upon
genus appears to have been mainly founded, *Cyathe*
correctly named.' The following is the definiti
typical species:—

C. arborea, Common Tree Fern, unarmed, or
distant short prickles on the main rachis, and stipes
frequently downy; fronds bipinnate, pinnules
elongate, much acuminated, deeply pinnatifid, gl
with the rachis and costa hairy, paler beneath; inv
riaceous, cup-shaped in age, a little contracted upw
ing with a beautifully even margin. It is a native o
Hispaniola, Martinique, St. Vincent, probably
India Islands generally, and Brazil.

In Hooker's 'Species Filicum' the members of
are distributed according to the districts in which t
Twenty-one species are natives of the West Indies
and South America. Two only are found in Sou
Eleven are natives of Eastern India and islands,
Islands, and New Zealand.

Few of these ferns are used by man, and, alth
elegant, are seldom cultivated. One of these, *C.*
a native of New Zealand, produces a starchy matte
used by the natives as food, and called *Marnaga.*
is found in the roots, and these are baked and eaten

(Hooker, *Species Filicum*; Burnett, *Outlines of*

CYATHOCRINI'TES, a genus of fossil Crino
fined to the Palæozoic strata. [ENCRINITES, P. C.]

CYATHOPHY'LLUM, a genus of Madr
which occurs fossil in Palæozoic strata, especially i
careous beds of the Silurian and carboniferous rock
works of Goldfuss, Murchison, and Phillips many
recorded from the Eifel, Salop, Devon, Yorkshire,
DREPHYLLIŒA, P. C.]

CY'BIUM, a genus of fossil fishes, from the Lo
of Sheppey. (Agassiz.)

CYBO', a Genoese family, said to be of Greek
several individuals of which distinguished themsel
military service of their country during the mi

e Innocent VIII., who was elected in 1485, was of this ly; and his grandson Lorenzo Cybò married, about 1520, carda Malaspina, heiress of the princely fiefs of Massa Carrara. His son Alberico Cybò Malaspina, after the th of his parents, became lord of Massa and marquis of ra in 1553, and his titles were confirmed by a diploma he Emperor Maximilian, dated August, 1568. Alberico ill remembered both at Massa and at Carrara as a wise beneficent prince. He died at a very advanced age 523, and was succeeded by his grandson Charles, who, g in 1662, was succeeded by his son Alberico II. Al- o II. obtained of the Emperor Leopold I. the title of ipality for his marquisate of Carrara, and he and his ssors were thenceforth styled dukes of Massa and princes rrara. Alberico II. died in 1690, and was succeeded by on Charles II. Alberico III., Charles's son, succeeded ther in 1710, and received the investiture of Massa and ra by a diploma of the Emperor Charles VI. Alberico died childless in 1715, and was succeeded by his younger er Alderano, who died in 1731, leaving three daughters, eldest of whom, named Maria Theresa, married Ercole ldo of Este, prince of Modena, in 1741, having obtained erself from the Emperor Francis I. the investiture of her rnal inheritance. Maria Theresa died in 1790, before husband, and was succeeded in her dominions of Massa Carrara by her only child Maria Beatrice, who remained the death of her father the heiress of the two houses of and Cybò Malaspina. She had married, in 1771, the duke Ferdinand of Austria, by whom she had the pre- Duke Francis IV. of Modena and other children. Maria rice continued to administer her principalities of Massa Carrara till the French revolutionary invasion. [Bacioc- P. C. S.] The treaty of Vienna of 1815 restored Maria rice to her dominions of Massa and Carrara. Maria Bea- died in 1829, and her dominions reverted to her son cis IV. of Modena, who has assumed the title of duke of a and Carrara.

lepetti, *Dizionario Geografico Storico della Toscana*, art. sa;' Viani, *Memorie Storiche della Famiglia Cybò*.)

YCADEOÏDEA. The fossil stems proved by Dr. R. n to be of the Cycadeous family, which occur in the of Portland, were thus named by Dr. Buckland. Brong- t called them Mantellia, and they are ranked by Presl as ites.

YCADI'TES. Fossil remains of plants allied to the na- l group of the Cycadeæ are thus named by various rs, but the species are now usually ranked under Ptero- llum, Zamites, Otopteris, &c.

YCLA'MEN, a genus of plants belonging to the natural r Primulaceæ. It has a bell-shaped half 5-cleft calyx; orolla with a short bell-shaped tube, and 5-partite reflexed ; 5 stamens inserted at the bottom, on the tube of the la, included; the capsule many-seeded, opening with 5 . The species are herbaceous humble plants with very some flowers.

hederifolium, has cordate angular crenate leaves, and the t of the corolla with 5 teeth. The root consists of a depressed tuber; the flowers are nearly white, seated long flower-stalks, which roll up after blossoming and the germen. This plant has been found in Great Bri- at Sandhurst, and near Cranbrook in Kent. It is rare, ifficult of cultivation. Its flowers exhale a pleasant fra- e.

Europæum common Cyclamen, has the leaves orbicular, te, crenate or toothed, the segments of the corolla lanceo- This species is found in the South of Europe. It has recorded as a native of Great Britain, but, if found, has bly been an escape from gardens. It is often con- ed with the former species. This plant is abundant in , where the wild boars prefer it to any other kind of Hence it is called sow-bread. It has been used medi- y; it acts upon the system as a cathartic, and was for- esteemed emmenagogue. The acrid principle of the has been separated under the name of *arthanatine*.

eral other species have been described. Most of are hardy plants and may be grown on an open r. They are peculiarly adapted for pots and for cham- ecoration in spring. One of the peculiarities of the is, that the flowers are seated on a twisted pedicel, , when the flowers fade, turn round and round till they the capsule which they bear in the earth. In this on the seeds ripen and germinate, and produce other s.

(Loudon, *Encyclopædia of Plants*; Babington, *Manual of Botany*; Burnett, *Outlines of Botany*; Koch, *Flora Germanica*.)

CY'CLICA, a family of Tetramerous Coleopterous insects established by Latreille. It is composed of three tribes, of which the genera *Cassida*, *Chrysomela*, and *Gallerucа* are the types. The larvæ of the insects of this family are remarkable for their habits. Some cover themselves up in their excrements; others, as the *Cryptocephali*, form tubes of fragments of wood, which they drag about with them; and others bury themselves in the interior of leaves, and live on the parenchyma. The larvæ of the Chrysomelidæ are naked.

CYCLA'RTHRUS, a genus of fossil fishes from the lias of Lyme Regis. (Agassiz.)

CYCLOGRAPH, or ARCOGRAPH, an instrument for drawing arcs of circles without centres, used in architectural and engineering drawing, when the centres are too distant to be conveniently accessible. One such contrivance, which however does not produce perfectly circular arcs, is described under Compasses, P. C., p. 421. Bricklayers and masons, when they wish to strike an arc upon the face of a wall, have recourse to a very simple but perfect mode of accomplishing the object, by driving a nail into the wall at each extremity of the intended arc, and then nailing two straight laths or rods together at such an angle that while their external sides or edges are in contact with the nails driven in the wall, their apex or meeting point shall touch the crown of the required arc or arch. When secured to each other at the required angle, the laths are so moved that while they remain in contact with the nails, the apex may traverse the whole distance from one nail to another, in doing which it will describe the required curve, which may be marked on the wall by a piece of chalk carried round with it. The same plan may be adopted in drawing on paper, substituting pins for the nails, and a piece of stout cardboard, cut to the required angle, for the laths. Mr. Rotch's Arcograph, described in the 'Transactions' of the Society of Arts, vol. xxxix. pp. 49-51, is an instrument consisting of two rules connected together by a joint which forms a socket for a pencil, and furnished with two quadrant-shaped pieces of brass, sliding upon one another, by which the rules may be set to any required angle, and secured by clasps. This instrument is used in the same way as the laths above described, and it affords the means of measuring, by the graduation of one of the quadrants, the degrees contained in the arcs described by it. Mr. Alderson's Curvilinead, described in the forty-fourth volume of the same work, pp. 151-156, is another instrument on the same principle, but of more perfect construction, in which the pencil may be projected beyond the apex of the angle for the purpose of drawing a second arc parallel with the first. This second arc is not mathematically correct, but, when on a small scale, it is sufficiently so for all ordinary purposes. Most satisfactory testimonials of the convenience and perfect action of this machine are appended to the description in the Society's 'Transactions.'

The Centrolinead of Mr. Peter Nicholson, described in the thirty-second and thirty-third volumes of the 'Transactions' of the above Society, pp. 67-70 and 69-81, is an instrument acting on the same principle, although its chief use is, not as a cyclograph, but as an instrument for drawing lines converging to a distant and inaccessible point. It may be compared to a T-rule in which the transom consists of two pieces adjustable to any required angle with each other, and the centre of which, answering to the apex of the cyclographs above described, is precisely on a line with the fiducial or drawing edge of the stem or long limb of the rule. The instrument being once adjusted to the required angles, and having its angular transom laid against two fixed pins, just like the angle of a cyclograph, any number of converging lines may be drawn by it as readily as parallel lines drawn by a common T-rule, with its transom sliding against the edge of the drawing-board.

Another instrument rewarded by the Society of Arts, and described in the thirty-fifth volume of their 'Transactions,' pp. 109-112, under the name of a Curvograph, was contrived by Mr. Warcup for copying or transferring curved lines, or describing them originally, of any required curvature, by means similar to those adopted in the instrument represented under Bevel, P. C. S., p. 192. The adjustable ruler itself consists of a thin pliable slip of whalebone, and the adjusting ribs, answering to the screws *f*, *f*, in the figure above referred to, instead of being screwed, are merely secured in any required position by the pressure of wedges acting upon small pieces of cork inserted in the ruler or stock through which they pass.

CYCLOID FISHES. One great division of fishes is thus termed by Agassiz, from the concentric striation apparent in their scales, of which the substance is horny, not bony nor enamelled. They are rare as fossils in all except the more recent strata, but abound in the actual creation.

CYCLOLITES, a genus of Madrephylliœa, including single-celled species. [MADREPHYLLIŒA, P. C.]

CYCLO'POMA, a genus of fossil fishes from Sheppey. (Agassiz.)

CYCLO'PTERIS, a genus of fossil ferns (Brongniart), remarkable for the size and orbicular or oval shape of the leafits. To the species from the coal-measures (C. orbicularis, C. obliqua, &c.) this remark applies better than to those (C. Beanii, dilatata, &c.) from the oolites, which are really of a different genus.

CYCLO'PTERUS. [DISCOBOLI, P. C. S.]

CYCLO'SIS. [SAP, P. C.]

CYLINDRICAL LENSES are made by grinding each of the opposite surfaces of a plate of glass in the form of the segment obtained on cutting a cylinder by a plane parallel to its axis. Two segments thus obtained being placed with their plane surfaces in contact, and so disposed that straight lines parallel to the axis of the cylinder being drawn on the convex surface of one may be at right angles to lines similarly drawn on the other, would constitute a lens of the kind here indicated.

Lenses of this kind were devised and executed soon after the commencement of the present century by an optician of Paris, who introduced them as eye-glasses in spectacles in place of the usual spherical lenses. This person afterwards, conceiving that in such lenses the chromatic aberration was destroyed, attempted to employ them as simple object glasses for telescopes. But the chromatic aberration is as great in the cylindrical as in the spherical lens; while the aberration arising from the form of the surface, which in spectacles is not always more apparent than the spherical aberration in a common lens, produced, when the image of an object was viewed through the eye-glasses of a telescope, distortions exceeding those of a spherical lens of equal focal length.

In fact, besides the impossibility of executing lenses of cylindrical forms with accuracy, it may be observed that all the sections passing through the optical axis, except two, will be bounded by portions of ellipses of different convexities in each section. Now, if these bounding lines were circular arcs, there would be the same aberration of the marginal rays as in a corresponding spherical lens: but, from the nature of the ellipse, the radii of curvature, instead of being constant, decrease as points are taken more remote from the extremity of the conjugate axis (the vertex of the lens); consequently the cylindrical aberration, as it may be called, will be greater than that which is produced by a spherical surface.

(Thomson's *Annals of Philosophy*, October, 1816.)

CYME. [INFLORESCENCE, P. C.]

CYMI'NUM CYMI'NUM, *Medical Properties of.* This annual umbelliferous plant (the generic name of which is most commonly spelt Cuminum, which mode is correct if it be a mere Latinized form of the Arabian word Qamoùn, but incorrect if it be a reduplication of the Greek κύμινον) is native in Egypt, Æthiopia, &c., and was cultivated by the antients in Palestine, as it is by the moderns in Malta and India. The fruit (improperly termed seed) is the officinal part. Externally it is of a greyish yellow colour, and is larger than those of carraway or anise. The seed within more readily separates from the pericarp than happens with most other umbelliferous fruits. It is distinguished from others by having the ridges (juga) prolonged into a point at the summit of the fruit. The primary ridges are five, filiform, and furnished with very fine prickles; the secondary are four, prominent and prickly. Beneath each of these is one vitta. The odour is strong aromatic, and rather unpleasant; the taste is warm, bitter, and disagreeable. The odour and taste are mainly due to a volatile oil which is more abundant in this fruit than in most umbelliferous plants: one pound yields half an ounce of this oil, according to some; while ten pounds yield only three ounces and a half, according to others. Not-
bstanding this large quantity of oil, the fruits are fre-
ly eaten by insects. The oil is pale yellow, but speedily
es brownish, very limpid, of a specific gravity of 0·975.
dour is, like that of the fruit, disagreeable, and the
acrid. When old it becomes acid, and according to
r contains succinic acid.

The disagreeable odour of cumin seems to have
discarded it from medicine for man, and restricted i
veterinary medicine. Its employment in this way n
relic of its antient repute, for the Israelites
highly as a remedy for cattle after the bites of
(Lady Callcott's *Scripture Herbal*, p. 124.)

Still it is a potent carminative, and was esteemed b
the best of this class of remedies, a preference to w
very large portion of essential oil it contains justly
It was reported also discutient and diuretic. In th
quality it was employed as a plaster. It was reckon
the semina 4 calida majora. In the north of Euro
still much used as an addition to bread and ragouts.
into the composition of many curry-powders, but sh
introduced into these in very small quantity.

CYNANCHUM (from κύων, a dog, and ἄ
strangle), a genus of plants belonging to the natura
Asclepiadeæ. It has a 5-parted somewhat rotate co
coronet of appendages consolidated, 5-20-lobed, when
with the segments opposite the anthers; the pollen
ventricose, pendulous; the stigma usually apiculate, so
blunt, very rarely with a beak enclosed below the summ
follicles smooth. The species are herbs or under-shru
opposite leaves and mostly twining stems.

C. Vincetoxicum has an erect stem, a beardless co
simple umbel with the pedicels three times longer t
peduncle; the corona 5-lobed. This plant is a n
sandy places in most parts of Europe, with the excep
Great Britain. It possesses emetic and purgative pro
and was once celebrated as an antidote for poisons, fro
it has derived its specific name.

C. Monspeliacum, Montpellier Cynanchum, is an her
twining glabrous plant, with roundish cordate-stalked
with a semilanceolate contracted point; the segment
corolla lanceolate, bluntish; the coronet tubular. It is
of the sea-coast of Italy, of Spain, the South of Fra
Greece. The juice of this plant is a drastic cathar
when dried it is used as a medicine under the name o
pellier Scammony.

C. ovalifolium is a smooth twining plant, with obl
acuminate leaves; many-flowered cymes; pedunc
longer than the petiole; the coronet 10-cleft, about as
the corolla; the stigma pointed, emarginate. This p
native of Penang, where, according to Dr. Wallich, it
for the purpose of procuring from its sap caoutchouc,
of an excellent quality.

C. Argel has erect, pale, round stems; the leaves
stalked, about an inch long, ovate lanceolate, acute, sm
each side, and rather wrinkled, glaucous on the und
the corymbs small, axillary, with many smooth a
branches; the sepals lanceolate; the corolla white, b
longer than the calyx. It is a native of Upper Egypt
leaves and the whole plant act as a powerful drastic pu
This plant appears to be a native of the same districts
from which the Alexandrian Senna is obtained, and
samples of that senna contain these leaves. They do n
ever appear to be added for the purposes of adulteratio
are collected with the leaves of the senna through the
ance of the persons employed in their collection. Th
of Tinnivelly Senna are not found to contain those
Cynanchum Argel mixed with them. Much of the un
griping effect of the Alexandrian Senna is attributed
writers on Materia Medica to the mixture of the leave
Argel. Senna leaves are also mixed with those of the
phocarpus fruticosus, which are in Syria also called A
Arghel.

The *Cynanchum Ipecacuanha* of Willdenow, the
pias asthmatica of Roxburgh, is now referred to the
Tylophora. [TYLOPHORA, P. C. S.]

CYNARA'CEÆ, one of the primary subdivisions
system of Jussieu, of the natural order Compositæ.
cluded in the Tubulifloræ of De Candolle. It is chara
by an erect seed, the absence of albumen, a hemis
involucre, the florets of the ray of the flower tubular, i
and regular. Of the three subdivisions this is the s
Its type is the genus *Cynara*, to which belongs the
artichoke, *C. scolymus*.

The genera of British plants belonging to this sub
are as follows:—

Section I.—*Carlineæ.*

Saussurea	1 species.
Carlina	1 species.

Section II.—*Centaureæ.*		
	Centaurea	**7 species.**
Section III.—*Carduineæ.*		
	Arctium	**2 species.**
	Onopordum	**1 species.**
	Carduus	**12 species.**
Section IV.—*Silybeæ.*		
	Silybum	**1 species.**
Section V.—*Serratuleæ.*		
	Serratula	**1 species.**

**Cynaraceæ differ from the Corymbiferæ in their active
ies in possessing in a more intense degree the bitter
e of the whole order. None of them seem to possess
ncy to develop the narcotic principle which charac-
he Cichoraceæ; nor is the volatile oil which gives to
of the Corymbiferæ a peculiar aromatic smell deve-
n these plants. The Carduus nutans (musk thistle) is
one which possesses any remarkable amount of odour.
valence of the bitter principle renders many of them
tomachic, tonic, and febrifuge medicines. For these
s, Centaurea, Calcitrapa, Cnicus benedictus, Carduus
Serratula arvensis, and Silybum marianum, have been
Some of them are said to be cathartic, and Echinops
ephalus, which has this property, is used in Languedoc
iedy for rheumatism. The seeds of various species of
dum yield a fixed oil, which in some parts is expressed
d for domestic purposes. Many of the Cynaraceæ
louring matters. The Carthamus tinctorius yields a
colour, and is employed to adulterate saffron; the
a tinctoria yields a yellow dye of a fine colour. A
of a blue colour is obtained from the flowers of Cen-
yanus. Some of them secrete small quantities of
and are used in consequence as astringents in medi-
the Onopordum acanthium. Galls also are found on
icus arvensis, which possess astringent properties,
o the tannin they contain. A number of species yield
The bracts of the involucre are, in some, very large;
they contain starchy and other alimentary secretions,
l as diet by man. The artichoke is a familiar instance.
ads of the Onopordum acanthium are often eaten in
e way. The tender sprouts of the Arctium Lappa are
d and eaten in the north of Europe. They are cooked
ame manner as asparagus. The tubers of the Cnicus
s are frequently cooked and eaten, and many other
yield starch in their roots. Animals do not generally
e plants belonging to the Compositæ. They seem
r occasionally to eat them medicinally, and the ass pre-
thistle to most other kinds of food.**

nett, ***Outlines of Botany;*** Lindley, ***Flora Medica;***
on, ***Manual of British Botany.)***

ODON, a genus of grasses belonging to the tribe
eæ. It has a 1-flowered fingered spike, with a superior
t; the glumes nearly equal, patent; the paleæ equal,
oat-shaped, compressed, embracing the inner; the
ng, distinct; the stigmas feathery, protruding below
mit of the floret.

actylon has 3-5 digitate spikes; smooth paleæ, the
owny beneath; the scions prostrate. It is a native of
d on the shores of Devon and Cornwall. *C. linearis* is
of the East, and is known by the name of *Durva-*

ington, *Manual of British Botany.*)

OGLOSSUM (from κύων, a dog, and γλῶσσα, a
, a genus of plants belonging to the natural order Bora-
It has a 5-cleft calyx; a funnel-shaped corolla with
uth closed, with prominent blunt scales; the stamens
d, filaments very short; the nuts roundish-ovate, de-
, muricated, attached by their inner edge. The species
s, with soft leaves.

fficinale, Common Hound's Tongue, has the leaves
acute; the lower leaves elliptical, contracting into a
the upper leaves lanceolate, narrowed below, sub-
, half-clasping. The corollas are of a dull red colour.
native of Asia, Africa, North America, and Europe.
ound in Great Britain in waste ground. The whole
s a disagreeable smell, resembling that from mice. It
o possess narcotic properties, and was at one time used
edy in scrofula, but it is not employed in medicine at
sent day.

ontanum has the leaves slightly hairy, acute, nearly
s and shining above, scabrous beneath, inferior, oblong, narrowed into a long petiole, upper leaves lanceolate, slightly narrowed below, clasping. It is found in Great Britain, by roadsides and in hedges in shady situations.

About fifty other species of Cynoglossum have been described, besides the British ones above named. They are all coarse plants, having only small flowers, so that few only are desirable for ornamental cultivation. They are however of the most easy culture, and will grow in almost any situation and soil. The greater number of the species are biennial, and may be propagated by sowing their seed in spring in the open border.

(Babington, *Manual;* Don, *Gardener's Dictionary.*)

CYPE'RUS. [CYPERACEÆ, P. C.]

CYPRIPE'DIUM, a genus of plants belonging to the natural order Orchideæ, and the tribe Cypripedieæ. It has a patent perianth; a ventricose inflated lip; column trifid above; the lateral lobes bearing stamens, the middle lobe sterile, dilated; the two lower sepals combined; the germen straight.

C. calceolus, Lady's Slipper, has a leafy stem; the middle lobe of the column nearly ovate, obtuse, deflexed; the lip slightly compressed, shorter than the calyx. This plant has been found in Great Britain, but is extremely rare.

All the species are exceedingly elegant plants. They are mostly inhabitants of North America and Northern India. Two new species have been lately introduced. In their cultivation they require great care. They will only thrive in a shady border in peat soil. The American species should be covered with some dry straw in very severe frosts, or if there should be too much wet: they are not easily increased, but will perfect seeds in favourable situations, particularly if pains be taken to apply the pollen to the stigma.

(Babington, *Manual;* Loudon, *Encylopædia of Plants.*)

CYRTO'CERAS, a Nautiloidal genus of fossils, proposed by Goldfuss, which occurs in the Palæozoic strata of Devon, the Eifel, and Ireland principally, and includes many species of great beauty and interest. The septa are pierced by a subdorsal siphon: the last whorl finishes in a straight extension. (*Phil. Pal.*, '*Foss. of Devon.*')

CYSTIPHY'LLUM, a genus of Madrephylliœa, proposed by Lonsdale, to include species which have a vesicular internal structure, instead of clearly defined horizontal diaphragms and vertical lamellæ. Occurs in the Palæozoic strata of Shropshire, Devon, and the Eifel.

CYSTO'PTERIS, a genus of Ferns belonging to the tribe Aspidieæ. It has the indusium attached by its broad hooded base under the sori, with a lengthened fringed free extremity, at first covering the thecæ.

C. fragilis, Brittle Fern, has bipinnate fronds; the pinnæ ovate-lanceolate; the pinnules ovate or ovate-lanceolate, toothed or pinnatifid. This is a remarkable variable species of fern. Three forms or varieties may be distinguished—*C. f. dentata*, with obtuse ovate pinnules, pointless, bluntly toothed or rarely pinnatifid, not decurrent; *C. f. angustata*, with pinnules linear, lanceolate, deeply and acutely pinnatifid or slightly toothed at the margin; the ultimate subdivisions oblong or linear, not dilated, rounded or ovate, sometimes notched at the end. The other form has the pinnules ovate, acute, pinnatifid, cut and serrated, slightly decurrent. These plants are common in Great Britain, and found on rocks and walls, especially in limestone districts. They are of a diminutive size, and of a remarkably brittle nature, from which circumstance they have obtained their common name.

(Babington, *Manual of British Botany;* Newman, *History of British Ferns.*)

CYTOBLAST. In the development of the tissues of plants from the *Blastema*, or *Cyto-blastema*, which is a fluid consisting of water holding in solution sugar, gum, dextrine, &c., some of the granules assume a definite form, and become darker than the surrounding granules. These dark spots may be seen in the fluids of the growing parts of all plants. It is to these that Schleiden has given the name of Cytoblasts. The cytoblast produces from its surface a cell: when the cell has become fully grown, other cytoblasts are produced in its interior, which, by producing other cells, burst the parent cell and increase the substance of the part in which they are found. [TISSUES, VEGETABLE, P. C.] A growing point of the same nature has been observed in the tissues of the animal kingdom, and it has been thus demonstrated that in the original growth of their tissues there is an identity between the animal and vegetable kingdom. [TISSUES. ANIMAL, P. C. S.]

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D.

DABŒCIA (from St. Dabeoc), a genus of plants belonging to the natural order Ericaceæ. It has a 4-parted calyx; the corolla oval, ventricose, the limb 4-toothed; 8 stamens inclosed, the filaments dilated, glabrous; the anther linear, sagittate at the base, the cells of the anthers parallel, loosened at the apex, dehiscing lengthwise; the stigma simple, truncate; the capsule 4-celled with a septicidal dehiscence. There is but one species, the *D. polyfolia*, which is a dwarf bushy evergreen shrub, a native of Ireland and the Pyrenees. This plant is the Andromeda Dabœcia of Linnæus, the Erica Dabœcia of Smith, the Menziesia Dabœcia of De Candolle, and the Menziesia polyfolia of Jussieu. In Ireland, which is its only locality in the British Islands, it is called Irish Whorts, Cantabrian Heath, and St. Dabeoc's Heath. It is a pretty shrub, and well fitted for decorating the fronts of shrubberies or for rockwork. It may be propagated by dividing the whole plant, or by cuttings, or by layers.

(Don, *Edinburgh Philosophical Journal*, vol. 17.)

DÆDALUS. [SCULPTURE, P. C.]

DAFFODIL. [AMARYLLIDEÆ, P. C.; NARCISSUS, P. C.]

DAHL, MICHAEL, a Swedish portrait-painter, who had a very successful career in England, in the reigns of Anne and George I., and was the principal rival of Sir Godfrey Kneller. He was born at Stockholm in 1656, was taught painting by Ernstraen Klocke, and came to England in 1678. He went about a year afterwards to Paris, where he remained a year; and from thence to Italy, where he spent three years in its principal cities. At Rome he painted the portrait of Christina of Sweden, then advanced in years; she terminated her wanderings and her eccentric life at Rome a few years afterwards.

In 1688 Dahl came again to England, 'where,' says Walpole, 'he found Sir Godfrey Kneller rising to the head of the profession, and where he had yet merit enough to distinguish himself as no mean competitor. His colouring was good, and, attempting nothing beyond portraits, he has certainly left many valuable pictures, especially as he did not neglect everything but the head, like Kneller, and he drew the rest of the figure much better than Richardson. Some of Dahl's works are worthy of Riley.'

Walpole mentions, among other works by Dahl, a portrait of his mother, at Houghton, which he says possessed great grace. There is an equestrian portrait by Dahl, at Windsor, of Charles XI. of Sweden, and there are several portraits in the gallery of admirals at Hampton Court, and some whole-lengths of ladies at Petworth.

'Virtuous and esteemed, easy in his circumstances, and fortunate in his health,' says Walpole, 'Dahl reached the long term of eighty-seven years, died in London in 1743, and was buried in St. James's church.'

(Walpole, *Anecdotes of Painting in England*, &c.)

DAISY. [BELLIS, P. C. S.]

DALBY, ISAAC, one of the many self-taught men of this country, who have attained considerable eminence in mathematical science by the mere force of genius, and in defiance of the obstacles opposed by fortune to their progress, was born in Gloucestershire, in the year 1744, and he appears to have been instructed in the rudiments of Latin and Arithmetic at a grammar-school in that county. By his friends he was destined to be a clothworker, but his taste leading him to the study of mathematics, he laboured, by the aid of Stone's Euclid, Simpson's Algebra, and Martin's Trigonometry, to qualify himself to be an usher in a country school; and he actually engaged himself in that unenviable capacity to a Mr. James, who kept a boarding-school at Stoke-Bishop near Bristol. At the end of three years he opened a school on his own account, in another part of the country; but meeting with no success, he came to London in 1772.

Here, in consequence of an advertisement, he offered himself, and was accepted, as an usher, to teach arithmetic in Archbishop Tenison's Grammar-school, near Charing Cross; and while fulfilling the duties of that employment, his name having already appeared in some of the magazines of that time, particularly the Ladies' Diary, among the correspondents who occasionally answered mathematical questions, he became *known to many* of the most celebrated men of science in town.

Among these were Dr. Maskeline, the astronomer
Hutton and Mr. Bonnycastle, both of the Roy
Academy at Woolwich, the Rev. Messrs. Crakelt
son, and Mr. Landen, Mr. Wales, Mathematical
Christ's Hospital, and Mr. Witchel, Master of
Naval Academy at Portsmouth: among them, als
names of many persons who, by day, pursued their
one as an attorney, another as a bricklayer, a third
man in Smithfield Market, and who, by night,
mathematical science as a recreation. In a letter
friend long afterwards Dalby observed that the gr
ber of these ingenious men had solved their last
and that with them the expression for life had bee
to zero.

Mr. Bayly, who had been employed in makin
mical observations in a building erected near Highg
Hon. Topham Beauclerk, for philosophical purpo
engaged to sail with Captain Cook, Dalby, after h
about a year at the school above mentioned, was ap
succeed him. In this situation, besides his duties
and librarian, he performed, under Dr. Fordyce, t
perimenter in chemistry; and amidst these emplo
found time to make himself acquainted with the
guage, and revive his knowledge of Latin. In
Beauclerk's establishment being broken up, and t
instruments, &c. sold, Dalby was engaged to ma
logue of the library of Lord Beauchamp; and in
ing year he was appointed Mathematical Master o
School at Chelsea. This was supported by volunt
butions, and it succeeded for a time under the m
of Mr. Jonas Hanway; but the subscriptions fallin
Institution was given up.

In 1787 Mr. Ramsden, the distinguished make
sophical instruments, to whom for several years
been known, recommended him, as an assistant,
General Roy, who was then employed in the trigo
operations for connecting the meridians of Gree
Paris; and during that and the following year h
ployed in extending the triangulation through Ken
of Sussex to the coast opposite France. Dalby
quently employed in making the computations pre
the publication of the account of the proceeding
this occasion he was led to apply a theorem (
Albert Girard) to the purpose of computing the ex
three angles of a spherical triangle above two ri
The account was published in the 'Philosophical Tr
for 1790; and in the volume for the same year is
Dalby on the figure of the earth, in which it is p
the 'excess' is, without sensible error, the same w
earth be a sphere or a spheroid. General Roy die
and in the following year Dalby was engaged, tog
Colonel Williams and Captain (since Major-Genera
to carry on the survey of England. [TRIGONOMETR
VEY, P. C.]

The operations commenced by a re-measureme
original base on Hounslow Heath, and before
quitted that service the triangulation was extende
the southern counties of England to the Land's E
accounts of the survey were published in the 'Ph
Transactions;' but in 1798 Dalby, together wit
Mudge, made a revision of General Roy's papers,
nected the operations of that officer with those
subsequently taken place to the end of 1796: thes
subjects of a volume which was published separatel

In the year 1799, on the formation of the Roya
College at High Wycombe, Dalby, in consequence
plication from Colonel Le Marchant, the Comm
Colonel Mudge, was appointed Professor of Math
the senior department of that Institution; at this t
observed in a letter to a friend, he was more than
of age, and desirous of securing a retreat from the
the field. He continued to hold that appointment
years that the department to which he belonged r
High Wycombe, and subsequently to its removal t
in Surrey: but in the year 1820, it being then uni
junior department at Sandhurst in Berkshire, his
obliged him to resign. He continued however to

ill his death, which took place October 14, 1824,
:as in the eighty-first year of his age.

ıtion to his duties was unremitting; and besides
ıtions to the 'Ladies' Diary' and other works, he
he use of the Military College a valuable Course of
es in two volumes, which, with successive improve-
:nded to a sixth edition.

rn's *Mathematical Repository*, vol. v.)

)N, JOHN, was born Sept. 5, 1766, at the village
eld, near Cockermouth in Cumberland, where his
eph Dalton, was the owner and cultivator of a
old estate, which descended to his eldest son Jona-
n, and is still held by one of the family.

lton attended a school kept by John Fletcher, a
l he was twelve years of age. In his thirteenth
nself began to keep a school at Eaglesfield, but he
ional assistance to his father in the farming opera-
1781, when he was fifteen, he removed to Kendal,
become an usher in the school of his cousin George
alton, for two or three years before he left Eagles-
been kindly noticed and assisted in his studies by
son, a man of property; and a similar good fortune
im at Kendal, where he obtained the friendship of
, a blind gentleman who was devoted to the study
philosophy, and who, besides the use of his library,
alton the advantage, which he valued still more
his instruction and conversation.

ontinued in his situation of usher till 1793, when
ı having been asked to name a person fit to become
f mathematics and natural philosophy in the New
osley Street, Manchester, he recommended Dalton,
cepted, and immediately removed to Manchester,
me his place of permanent residence during the rest
The college was removed to York in 1799, when
hdrew from it, and began to give lessons in mathe-
natural philosophy at his residence in Manchester,
at private seminaries. He afterwards delivered
ures, of which the first course was given in the
:he Literary and Philosophical Society of Man-
ıd consisted of twenty lectures on experimental
; he subsequently gave lectures at London, Leeds,
n, and other places in England and Scotland. He
for several years the situations of secretary and
ent of the Manchester Literary and Philosophical
which he had become a member in 1794; in 1817
cted president, and was re-elected every year till

Dalton paid a visit to Paris, with a single intro-
hich was to Brequet, the eminent watchmaker;
e received an invitation from La Place, by whom
troduced to the most distinguished scientific and
en in Paris. Before this time however Dalton
ıed his most important discoveries in natural phi-
ıd chemistry; his merits were consequently well
the French chemists, and they became more and
y appreciated in England during every succeeding
life.

IV. having, in 1826, given 100 guineas to the
ety of London for the purchase of two gold medals
ı to persons who had most distinguished themselves
ries in science, the first medal was unanimously
r the council to Dalton. He attended, at York in
irst meeting of the British Association for the Ad-
of Science, and was the object of general respect
ation; at the second meeting, at Oxford in 1832,
sity conferred on him the title of Doctor of Civil
ıe third meeting, at Cambridge in 1833, Professor
after pronouncing an eulogium on his character,
that William IV. had granted him a pension of
r; at the fourth meeting, in Edinburgh in 1834,
sity of Edinburgh conferred on him the degree of
d the Royal Society of Edinburgh elected him a
In 1836 his pension was raised to 300*l*. a year.

the honours conferred upon Dr. Dalton during the
f the British Association, his friends in Manchester,
bscribed 2000*l*., and employed Chantrey to execute
him in marble, which is now in the entrance-hall
al Manchester Institution.

l0th of April, 1837, Dr. Dalton, then in his seventy-
had a severe attack of paralysis, and another slight
the 21st; his right side was paralysed, he was
f the power of speaking, and his mind appeared to
degree affected, but after an illness of some months his body and mind regained their powers, and his voice was restored, but his articulation was less distinct ever afterwards.

On the 3rd of May, 1844, Dr. Dalton had a third paralytic stroke, which affected his right side, and increased the indistinctness of his articulation. He partly recovered from the attack, and on the 19th of July attended a meeting of the council of the Manchester Literary and Philosophical Society, when he received a copy, engrossed on vellum, of a complimentary resolution passed at the annual meeting of the Society. Being unable to articulate distinctly, he delivered a written reply. He died July 27, 1844. He had made his usual entry of meteorological observations, but with some symptoms of indistinctness of memory, before he retired to rest on the previous night. The inhabitants of Manchester expressed their estimation of his character by a public funeral. His body lay in state in the town-hall, and was visited by more than 40,000 persons in a single day. He was buried in the cemetery at Ardwick Green, on the 12th of August. The funeral ceremony was conducted with great magnificence, and was attended by a vast concourse of persons.

Dalton, during his residence at Kendal, had occasionally contributed to 'The Gentleman's and Lady's Diary,' and in 1788 had commenced a series of meteorological records and observations, the first results of which he published soon after he went to Manchester, under the title of 'Meteorological Observations and Essays,' 8vo., 1793. He continued the habit of observing and recording the state of the atmosphere with the greatest regularity till the day before he died, taking several records daily; he had registered altogether upwards of 200,000 independent notices. His first essay in the 'Transactions of the Manchester Literary and Philosophical Society' related to a peculiarity of his own sight, and was entitled 'Extraordinary Facts relating to the Vision of Colours, with Observations, by Mr. John Dalton.' It was read October 31, 1794, and is inserted in the 'Transactions,' vol. 5, part 1. In 1801 he published 'Elements of English Grammar,' London, 8vo., probably in expectation of making a small addition to his limited income, for his tastes and pursuits were by no means philological or literary.

In the Manchester Transactions for 1802, part 2, there are six papers by Dalton, chiefly on subjects of meteorology, of which the most important is one called 'Experimental Essays on the Constitution of Mixed Gases; on the Force of Steam, or Vapour from Water and other Liquids, in different Temperatures, both in a Torricellian Vacuum and in Air; on Evaporation; and on the Expansion of Gases by Heat.' He discusses with great acuteness the difficult problem of the equal diffusion throughout each other of gases of unequal densities; and, besides other facts of importance, he proves that water, when it evaporates, is always converted into an elastic fluid, or vapour, and that the elasticity of this vapour increases as the temperature increases; at 32° of Fahrenheit it balances a column of mercury about half an inch in height; at 212° it balances a column 30 inches high, or is equal to the pressure of the atmosphere. He determines the elasticity of vapour at all temperatures from 32° to 212°, points out the method of determining the quantity of vapour which exists at any time in the atmosphere, and determines the rate of evaporation from the surface of water at all temperatures from 32° to 212°. The principles laid down in these essays have been of the highest importance to chemists in their investigations respecting the specific gravity of gases, and have enabled them to solve many interesting problems.

Dalton began to work out his grand discovery of the atomic theory in 1803; in August, 1804, he explained it distinctly and fully to Dr. Thomas Thomson, who was then on a short visit to Manchester; he touched upon it in a lecture before the Royal Institution of London in 1804, and subsequently in lectures at Manchester, Edinburgh, and Glasgow; but Dr. Thomson was the first to publish a short sketch of it in 1807, in the third edition of his 'System of Chemistry.' Dr. Wollaston became at once aware of its importance, and he and Dr. Thomson endeavoured to make a convert of Davy, but they could not convince him, and he treated the whole matter with ridicule. Mr. Davies Gilbert however soon afterwards made him aware of its truth, and he was ever afterwards a strenuous asserter of its great value; in his last course of lectures at the Royal Institution of London in 1814 he observed, that among the discoveries of modern times one of the greatest was the result of the application of mathematics to chemistry by Dalton.

In 1808 Dr. Dalton published 'A New System of Chemical

Philosophy,' 8vo., vol. 1. In the first chapter he treats of heat; in the second, of the constitution of bodies, in which his chief object is to oppose the peculiar notions respecting elastic fluids which had been advanced by Berthollet and were supported by Dr. Murray of Edinburgh; in the third chapter, which occupies only a few pages, he gives the outline of the atomic theory. In a plate at the end of the volume he gives the symbols and atomic weights of 37 bodies, twenty of which were then considered simple, and the seventeen others compound. In the 2nd volume of his 'New System of Chemical Philosophy,' published in 1810, he treats of the elementary principles, or simple bodies, oxygen, hydrogen, azote, carbon, sulphur, phosphorus, and the metals; next he treats of the oxygen combined with hydrogen, azote, carbon, sulphur, and phosphorus; and of hydrogen combined with azote, carbon, sulphur, and phosphorus; finally, he treats of the fixed alkalies and earths. The table of atomic weights at the end of the volume, though more complete than the one he had given at the end of the first volume, is still very imperfect.

The atomic theory is probably the most important contribution which has ever been made to chemistry, and hardly less important were Dalton's attempts to determine the atomic weights of the different substances, though scarcely a single number was determined correctly. At the time when he made his discovery there was not a single chemical analysis which could properly be considered as correct; there was not a single gas whose specific gravity was known with any approach to accuracy; and Dalton displayed infinite sagacity in coming so near the truth as he did. Since the introduction of the atomic theory, the knowledge of chemical combination has been simplified to an amazing extent, and the processes of analysis, which constitute the essence of chemistry, have assumed a degree of accuracy almost approaching to mathematical precision. Manufactures have been benefited as well as science; the quantity of each constituent of any article can be regulated with perfect accuracy, so that there is no waste, and the result of the combination can be reckoned upon with unfailing certainty.

Dalton represented his atoms by symbols, as, for instance, oxygen by a circle, hydrogen by a circle with a dot, and other elements by similar simple figures. He considers that all bodies are composed of atoms, which, however small, have a definite size and weight. The symbols of oxygen and hydrogen placed together represented water, which he supposed to be composed of an atom of each; and other symbols were used in a similar manner. The atomic weights are the relative or combining weights, not the absolute weights. Assuming hydrogen to be the lightest body, he called it 1; oxygen he determined to be 7, but it has since been ascertained to be 8. Dr. Wollaston has called oxygen 1; hydrogen then becomes ·125. Dalton not only stated the general principle of combination in definite proportions, but he stated the chief laws of combination on which modern chemical analysis is based: 1, that the same compound consists invariably of the same constituents; 2, that the elements of every compound always unite in the same proportion by weight (and Gay-Lussac, in 1809, proved that gases unite in the same proportion by volume as well as by weight); 3, that, when any element combines in more proportions than one, those proportions are multiples—1, 2, 3, 4; 6, 12, 18, 24; 8, 16, 24, 32, and so on; 4, that, if two substances combine in a certain proportion with a third, they combine in exactly the same proportion with each other; 5, that the combining proportion of a compound is the sum of its constituents, as hydrogen 1 + oxygen 8 = water 9. Davy substituted the word proportion for that of atom, and Wollaston that of equivalent, which is now generally used; but, whatever be the term, the meaning is the same; and in proportion as analyses have become more accurate, the laws which Dalton laid down have been more remarkably confirmed. For the details, see ATOMIC THEORY, P. C.

The third volume of Dalton's 'New System of Chemical Philosophy' was not published till 1827, but the greater part of it had been printed nearly ten years before. He treats of the metallic oxides, the sulphurets, phosphurets, carburets, and of the alloys. In the interval between the printing and publication, many of the facts had been anticipated by others, and some of them carried much farther. The most important part of the volume is the appendix, of about ninety pages, in which he discusses with his usual sagacity various important matters connected with heat and vapour. He gives a new table of atomic weights, much more copious than those
contained in the two preceding volumes, and in
troduces the corrections rendered necessary by t
correct analyses which had been made since th
of the second volume.

Dr. Dalton's other works, which are tolerabl
are inserted in the 'Manchester Transactions,'
Journal,' the 'Philosophical Transactions,' and
sophical Magazine,' and consist of experiments
tions on heat, vapour, evaporation, rain, wind,
borealis, dew, and a variety of other physical sub

Dr. Dalton was of middle stature, and strongly
face is said to have resembled the portraits of N
power of mind was naturally strong; he was a pati
and an independent thinker, with the most perf
ance, and with an extraordinary power of tracing
of physical phenomena; his experiments had ra
lated character, but were steps in some process of
ralization. By such a process, comparing th
numerous experiments and numerous facts whic
established, he elicited order out of seeming co
may truly be said to have become the legislator o
which before his time was little better than an
art—an accumulated mass of unconnected and im
veloped facts. Dalton laid down the laws of t
tion of substances, and at once advanced chem
rank of a science. His moral character was w
intellectual. He was a man of the strictest truth a
independent, grave, reserved, but not austere; fr
parsimonious. Unassuming, the honours which
were voluntarily bestowed upon him by those w
able to estimate the value of his services to scienc
facturing industry; unostentatious, it was some
his townsmen in Manchester were aware of his
small circle of friends appreciated him highly, and,
he received his pension, offered to provide him w
pendence, that he might devote the whole of
science, but he declined to accept it, observing '
was a kind of recreation, and that if richer he wo
not spend more time in his investigations than h
tomed to do.' His mode of life was singularly u
was rarely from home except when he went to s
lecture; he attended the meeting of the Society
of which he was a member, twice every Sunda
daily to his laboratory, of which the apparatus
simplest and indeed rudest kind; he played at b
afternoon of every Thursday; and he paid an an
his friends and the mountains in Cumberland an
land. He was never married. He had left 200
a chair of chemistry at Oxford, but he revoked
before his death, and is said to have left the m
relatives of those who had assisted him in his earl

Dalton was elected a Fellow of the Royal S
1821; he was elected a corresponding member
tute of France, and a few years later was enroll
Fellow. He was also a member of the Royal A
Science of Berlin and Munich, and of the Nat
Society of Moscow.

(Thomson's *History of Chemistry*, vol. ii.; *Ph*
Journal, Oct. 1841; *Life and Discoveries of D*
tish Quarterly Review, No. 1; *British Associatio*

DAMMAR PINE, DA'MMARA. [AGAT

DANCE. There are two architects of this
and son. The elder GEORGE DANCE was arch
Corporation of London, and erected the Man
the first stone of which was laid October 25th, 1
edifice has been in a manner 'damned' to fame, a
too who have been exceedingly liberal of their p
buildings in not much purer taste—for instance, S
Church. Ralph, the architectural oracle of Lo
last century, says, in regard to it, 'The man pi
and who afterwards carried his plan into exe
originally a shipwright; and, to do him justice,
never to have lost sight of his first profession.'
such was really the case, or whether the remark
ignorance, if not with malice, we are unable to say
the structure, although certainly not in the happi
refined taste, it by no means deserves the obloq
been heaped upon it; for if in some respects rath
it is at all events a stately mass, and has a 'monum
Telford says of it, 'It is grand and impressive as a
reflects credit upon its architect;' and his opini
pressed of it while the building was as originall
with the huge superstructure across the roof at the

xcrescence was taken down in 1840. The elder
built the churches of St. Botolph, Aldgate; St.
St. Leonard, Shoreditch. He died February 8th,
vas succeeded in his appointment of City Surveyor
st son,

DANCE, JUN. (born in 1740), whose talent ac-
the family name far higher distinction. Not only
to architecture, as a pursuit in which a safe and
er, if not a brilliant one, was opened for him, he
himself to the study of it with a diligence exceed-
as required by the routine of that day, and he fur-
sed both a natural and cultivated taste for the fine
lly, poetry included. He certainly stamped some-
etry, as well as energetic character, on the very
work he executed; nor had he long to wait for
nity by which he signalized himself, for Newgate,
lest of prisons,' was begun by him in 1770. This
ne of the few truly monumental pieces of archi-
the metropolis, has been chiefly extolled for its
gree of character; yet it surely requires no very
y to make an edifice of so peculiar a class express
so clearly that it cannot possibly be mistaken for
han what it is. Newgate might have been equally
n aspect had it been merely a dismal mass, utterly
ll æsthetic charm; it was by conferring upon it
by breaking up the monotony of such a mass so as
to disturb unity, but enhance it—not to dissipate
littleness, but blend and condense them into one
whole—that Dance showed himself a great artist
, a great tragic architect. The mode of treatment
him might in less able hands have only weakened
ion aimed at; whereas here it renders it all the
etic and the more intense. Truly felicitous is the
which, by being divided into boldly distinct and
ated parts, the composition acquires artistic play
ing anything of its severity. Truly felicitous also
e relief both as to perspective and light and shade
it, not according to the usual practice of bringing
rd, but of *recessing* them, and placing masses in
others, so that the general line of front is pre-
oken in its lower part. The great drawback on
se masterly composition is the centre compartment,
r's house.' Well intended as is the kind of con-
en that part and the rest, the contrast actually pro-
from the happiest, the character given to the centre
what prosaic and insignificant—by far too much
an ordinary dwelling-house, the windows being so
oportion to the space they occupy, as absolutely to
d cut it up, to destroy breadth and repose, and to
air of littleness; whereas, had there been only
ws on a floor, instead of five, the effect would have
parably better externally, and probably without
t inconvenience as regards internal plan. At all
attic story is a sad blemish, a most paltry termina-
centre of such a pile; but we believe we may vin-
e from the reproach of it, because not only does
an addition to the building, but really seems to have
er and most unlucky alteration, since some prints
nt the centre of the edifice crowned by a pediment,
variety to the whole composition, without any sacri-
ity. If it was Dance himself who was afterwards
enough to mar his own work, in order to provide
al story that might just as well have been con-
in the roof, very little is the pity we have to
n him.

ximity of Newgate has perhaps deprived Giltspur
pter of some of the celebrity it might else have
a piece of architecture; and yet the same prox-
altogether favourable to the other, the *fenestration*
the design of the Compter being decidedly better
f the governor's residence in Newgate. Resem-
tter in style, this other work of Dance's is of dif-
acter from it—of that of the older Florentine pa-
h, unpalatial as it may be to English eyes, has of
been affected and revived in Germany, both for
es and other buildings, intended for far different
an prisons. Dance has derived much more fame
uke's Hospital than from the Compter; in fact
we can account for. Undoubtedly it looks ex-
e what it is, and so generally does an ordinary
; it is a mere horrible reality without any æsthetic
sed into it. Whether that building has been over-
ot, there can be but one opinion as to the front of
Guildhall, erected by Dance in 1789. Its ugliness we might tolerate, its absurdity we might excuse, but ugliness, absurdity, and excessive paltriness combined together render it quite unendurable. In mitigation of the sentence due to such a monstrosity, it is a very poor plea to urge that Gothic architecture was then scarcely understood at all by any one; for, whether understood or not as style, its character might have been perceived—its expression felt—by any one who had seen any examples of it. If Dance had nothing else to study, there was at least the porch of the building before his eyes just as it now remains; and there was also, what has since been taken down, the small Gothic chapel attached to the east end of the front. So far from being any excuse, his utter ignorance of the style only renders his attempting it all the more unpardonable. For doing so there certainly was no occasion, because, even had it been tolerably satisfactory, the front he added would have still been a mere mask to the hall itself, inasmuch as, instead of indicating a single capacious room in any part of the interior, its physiognomy is that of a building divided into several floors.

Among Dance's minor works are the Shakspere Gallery, Pall Mall, now the British Institution, and the Theatre at Bath, in the front of which last he introduced the tasteless heresy adopted by his pupil Soane [SOANE, P. C.], of pilasters without bases or capitals, and having more the character of carpenter's or joiner's work than masonry.

Dance was not only one of the earliest members of the Royal Academy, but held for several years the office of Professor of Architecture; yet he never delivered any lectures, nor does he seem to have exhibited drawings at its exhibitions. Still if he neither lectured nor wrote upon that branch of art which he pursued as a profession, he gave the world evidence of his ability in a department of art wholly unconnected with architecture; we allude to the very interesting series of portraits of the public characters and artists of the day, which appeared in two volumes, folio, 1811-14, and were engraved by Wm. Daniell, R.A., in imitation of the original drawings. All of them have the air of being striking likenesses, far more truthful indeed than always flattering, and they have also the peculiarity of being nearly every one of them represented in profile and looking the same way. Dance held his appointment of City Surveyor till 1816, when he resigned in favour of his pupil, the late W. Montague; but he survived his retirement from practice several years, and died at his house in Gower Street, January 14th, 1825, at the age of eighty-four. He was buried in St. Paul's, near Wren and Rennie.

His younger brother, NATHANIEL DANCE, third son of the elder George Dance, would have ennobled the family name still more as one distinguished in art, had he chosen to pursue the career in which he had begun to display more than ordinary talent. Poetical compliments are not to be received with implicit trust, but we may presume that the artist must have been skilful of whom Hayley has spoken so highly in his second epistle on painting:—

> 'To Dance's pencil, in precision strong,
> Transcendant force and truth of line belong,' &c.

In 1774 he exhibited his Orpheus lamenting Eurydice, and in 1776 his Death of Mark Antony. What more than anything else casts doubt upon Nathaniel Dance's talent for art was the vulgar ambition which led him not only to abandon his pencil when he had no longer any occasion to exercise it for emolument, but even to try to obliterate all record of his works by buying up and destroying as many of them as he could meet with. The fine figure and captivating address of Nathaniel Dance obtained for him the hand of the wealthy Yorkshire heiress, Mrs. Dummer, and from that time he became heartily ashamed of his former profession. On his marriage he had taken the name of Holland in addition to his own, and he was made a baronet in 1800. The income he acquired with his lady was about 18,000*l.* per annum, and as the Dummer estates were entailed, he contrived to amass for himself about 200,000*l.*, for he was one of those of whom it has been said that their 'great aim through life is to secure something to live upon after they are dead.' Sir Nathaniel Dance Holland died very suddenly at Winchester (near which city he resided, at Cranbury House), Oct. 15th, 1811. His money went to his relations, his baronetcy became extinct, and the title for talent which he might have left, he had himself renounced and extinguished.

DANIELL. WILLIAM DANIELL, R.A., painter and engraver, was born in 1769, and at the age of fourteen accompanied his uncle, Thomas Daniell, to India. They commenced their journey at Cape Comorin, and explored and sketched almost everything that was beautiful or interesting in the country between that point and Serinagur in the Himalaya Mountains: this arduous undertaking occupied them ten years. They took an amazing number of sketches, many of which they afterwards engraved and published, in a large form, comprised in one great work entitled 'Oriental Scenery,' in six volumes folio, completed in 1808. Five of these six volumes were engraved by or under the direction of William; the remaining volume, containing the 'Caves of Ellora,' was executed by Thomas, from drawings by James Wales. Besides the above work, William Daniell engraved and published, between 1801 and 1814, the following works:—'A Picturesque Voyage to India;' 'Zoography,' in conjunction with Mr. W. Wood; 'Animated Nature,' 2 vols.; a series of views entitled 'The Docks;' and 'The Hunchback,' after R. Smirke, R.A. Between 1814 and 1825 he was chiefly engaged in a work of extraordinary labour, entitled 'Voyage round Great Britain.' In this arduous undertaking he spent the summer of every year, collecting drawings and making notes. The difficulties he met with in prosecuting this plan were extreme, and had it not been for the cheering influence of the hospitable reception which he occasionally experienced from persons to whom he had letters of introduction, the accomplishment of his task would have been impossible: 'immense fatigue, exposure to weather of all kinds, wretched fare, and still more wretched accommodation, were his constant attendants.'

Besides those works, Daniell painted many large and beautiful oil pictures of remarkable places or scenes in India. In 1832 he painted, in conjunction with Mr. Paris, a panorama of Madras; and, more recently, two others by himself—'The City of Lucknow,' and 'The Elephant-hunt;' and he was a great contributor to the 'Oriental Annual.' His style of colouring was rather hard and red, which arose probably from the climate of India and the peculiar nature of its scenery. He died in 1837.

THOMAS DANIELL was likewise a member of the Royal Academy, and a very able landscape painter and engraver; he was originally a heraldry painter. He published some works on India besides that already mentioned. He was a fellow of the Royal, of the Asiatic, and of the Antiquarian societies. He died in 1840, aged ninety-one. Another member of this family, SAMUEL DANIELL, also distinguished himself by some similar works. He spent three years at the Cape of Good Hope, and published, in 1808, some prints, descriptive of the scenery, habitations, costume, and character of the natives, and an account of the animals of Southern Africa. He published also, in 1808, illustrations of the scenery, animals, and native inhabitants of the island of Ceylon.

(*Literary Gazette*, 1837, 1840.)

DANIELL, JOHN FREDERICK, was born in Essex Street, Strand, March 12, 1790, and was the son of Mr. George Daniell, of West Humble, Surrey, bencher of the Middle Temple. At an early age he became a pupil of Professor Brande, in whose society he made several tours, and of whom he always spoke as one endeared to him by similar tastes and early associations. Mr. Daniell entered originally into business as a sugar-refiner. His fondness for scientific investigations was however manifested at a very early age, and, when a mere lad, he used often to astonish his young companions by exhibiting to them some of the wonders of pneumatic chemistry, a department of physical science on which the labours of Black, Cavendish, Lavoisier, and Priestley had recently thrown a new and unexpected light. He soon relinquished business for pursuits more congenial to his taste. In 1814 he became a fellow of the Royal Society. In 1816, associated with Professor Brande, he commenced the 'Quarterly Journal of Science and Art,' the first twenty volumes of which were published under their joint superintendence. He married in the following year Charlotte, youngest daughter of the late Sir W. Rule, surveyor of the navy. From this time to his death hardly a single year elapsed without the appearance of one or more essays on chemical or meteorological subjects from the pen of Mr. Daniell. In 1820 he published the account of his new hydrometer, an instrument which, for the first time, rendered regular and accurate observations on the dryness and moisture of the air practicable. In this instrument he applied the principle of the cryophorus of Wollaston to obtain the requisite cold for the production of dew upon a ball of dark-coloured glass containing æther. The temperature of the inclosed æther is measured by a delicate thermometer without the *bulb, and corresponds* with the dew-point. This instrument
has been extensively employed in all climates, and ha
the greatest service to meteorology. In 1823 his gr
'Meteorological Essays,' appeared, which is still the
work on the science of which it treats. A second ed
published in 1827, and he was engaged in revising
the third edition at the time of his death. This wa
synthetic attempt to explain the general principles o
ology by the known laws which regulate the temper
constitution of gases and vapours, and in which the
observations and isolated phenomena presented by th
atmosphere were considered in their most extensive
ral bearings.

One of the most interesting of his theories conne
meteorology was that which he proposed to accoun
horary oscillations or periodic daily rise and fall o
rometer, by which he predicted the occurrence of
the poles coincident with the rise at the equator.
observations soon confirmed the accuracy of his th
the existence of this unsuspected phænomenon was
beyond dispute.

In the year 1824 he published an 'Essay on
Climate,' for which he received the silver medal of
ticultural Society. Dr. Lindley has expressed
opinion on the practical value of this paper in
revolutionizing the methods of horticulture till then

About this period Mr. Daniell became managin
to the Continental Gas Company, and travelled thr
of the principal European cities with Sir W. Con
Col. Landmann, making the arrangements by whic
them are lighted at the present day. He also inven
process for obtaining inflammable gas from resin,
some of the large towns in America are now lighted

On the establishment of King's College in 18
appointed Professor of Chemistry, the duties of w
he discharged to the day of his death. About th
published the account of his new Pyrometer, an
still the best for measuring high temperatures, suc
of fusing metals, furnaces, &c. For this simple a
invention, the Royal Society, in 1832, awarded him
ford Medal, a triennial medal left by Count Rum
Royal Society, to be given for the most important
or invention relative to the theory of heat or its a
that had been made throughout the known world
time of its last adjudication. From this time his
seems to have been principally devoted to voltaic
In 1836 he communicated to the Royal Society
which he described his valuable improvement in
battery. In this communication he traced the ca
rapid decline of power in batteries of the ordinary d
and pointed out an arrangement by which a powerful
tinuous current of voltaic electricity may be maintai
unlimited period. The importance of this discover
cognised immediately by the whole scientific wor
appreciation of its merit, the Royal Society, in 1837
him the Copley Medal, for the most important sci
covery made in any part of the world during the
year. In 1839 he published his 'Introduction to
Philosophy,' an admirable treatise on the action of
forces in general, though it modestly professes to
more than a simple introduction to the discoveries o
and their applications to chemistry. He continu
searches in the same department of science till the
decease, communicating the results of his experim
Royal Society. For two of these papers, bearing m
tially on the theory of salts, he received, in 1842,
Royal medals.

In 1843 the University of Oxford conferred upo
honorary degree of D.C.L., and in the same year he
the second edition of his 'Introduction to Chemi
sophy.' For more than thirty years he was a ze
active member of the Royal Society, and for the last
he held the honourable office of foreign secretary to th
body. Besides his professorship in King's College
the post of lecturer to the East India Company's mili
nary at Addiscombe, and was examiner in chemis
University of London since the opening of that insti

On the 13th of March, 1845, Mr. Daniell, while
a meeting of the council of the Royal Society, a
just spoken on a point under consideration, app
perfect health, was seized with an apoplectic fit.
minutes from the commencement of the attack he
A subscription has been entered into at King's C
the purpose of having a bust executed, and for the

t, in connexion with the college, of a Daniell Scholarship e science of which he was so distinguished an ornament. is worthy of remark, as illustrating the extent and diver- of his attainments, and the importance of his discoveries, he is the only individual on whom all the three medals in ift of the Royal Society were ever bestowed. The follow- s a list of his most important essays, with their dates:—

16, 'On some Phenomena attending the process of solu- ' in 'Quarterly Journal of Science,' vol. i. p. 24.

17, 'On the mechanical structure of iron, developed by ion, and on the combination of silex in cast-iron,' ditto, i. p. 278.

17, 'On a new species of resin from India,' ditto, vol. p. 113.

18, 'Observations on the theory of spherical atoms, and elation which it bears to the forms of certain minerals,' , vol. iv. p. 30.

18, 'On the strata of a remarkable chalk found in the ity of Brighton and Nottingham,' ditto, vol. iv. p. 227.

19, 'On the Formation and Decomposition of Sugar, the Artificial Production of Crystallized Carbonate of e,' ditto, vol. iv. p. 32.

19, 'On the Acid formed in the slow Combustion of r,' ditto, vol. vi. p. 319.

20, 'On a new Hygrometer,' ditto, vol. viii. p. 298.

21, 'Description of a new Pyrometer,' ditto, vol. xi. p. 309.

21, 'Experiments to ascertain the effects of the great se in September, 1820.' 'On the Gaseous and Aqueous ospheres,' ditto, vol. x. p. 123.

22, 'Inquiry, with Experiments, into the Nature of the ucts of the slow Combustion of Ether,' ditto, vol. xii. p. 64.

22, 'Comparative Remarks (with three tables) on the ther, and Seasons of the years 1819, 1820, and 1821,' , vol. xii. p. 111.

822, 'On the Correction to be applied in Barometrical uration for the Effects of Atmospheric Vapours by ns of the Hygrometer,' ditto, vol. xiii. p. 76.

823, 'Meteorological Essays,' first edition.

824, 'Essay on Climate considered with regard to Horti- ure,' in 'Horticultural Transactions,' 1824, p. 1.

825, 'Observations and Experiments of Evaporation,' Quarterly Journal of Science,' vol. xvii. p. 46.

825, 'On the Horary Oscillation of the Barometer,' ditto, xvii. p. 189.

825, 'Observations on the Radiation of Heat in the Atmo- re,' ditto, vol. xvii. p. 305.

26, 'On the Oscillations of the Barometer,' ditto, vol. p. 82.

26, Another paper on the Barometer, ditto, vol. xxi. 0.

26, Correspondence concerning the last paper, ditto, xxi. p. 289.

27, Second edition of 'Meteorological Essays.'

30, 'On certain Phenomena resulting from the Action ercury on different Metals,' in 'Royal Institution Jour- vol. i. p. 1.

30, 'On a New Register Pyrometer for measuring the nsion of Solids, and for determining the higher degrees emperature upon the Common Thermometric Scale,' Phil. Trans.,' 1830.

31, 'On the Relation between the Polyhedral and Sphe- l Theories of Crystallization, and the Connexion of the r with the Experiments of Professor Mitscherlich,' in al Institution Journal,' vol. ii. p. 30.

31, 'Further Experiments on a New Register Pyro- r for measuring the Expansion of Solids,' in 'Phil. s.,' 1831, p. 443.

32, 'On the Water Barometer erected in the Hall of the l Society,' in 'Phil. Trans.,' 1832.

26, 'On Voltaic Combinations (the Constant Battery),' Phil. Trans.,' 1836, p. 107.

36, 'Additional Observations on Voltaic Combinations,' , 1836, p. 125.

37, 'Further Observations on Voltaic Combinations,' , 1837, p. 141.

38, 'Fourth Letter on Voltaic Combinations,' ditto, , p. 41.

39, 'Introduction to Chemical Philosophy.'

39, 'Fifth Letter on Voltaic Combinations, with some unt of the Effects of a large Constant Battery,' ditto, , p. 89.

39, 'On the Electrolysis of Secondary Compounds,' , 1839, p. 97.

1840, 'Second Letter on Electrolysis of Secondary Compounds,' ditto, 1840, p. 209.

1841, 'On the Spontaneous Evolution of Sulphuretted Hydrogen in the Waters of the Western Coast of Africa, and of other Localities,' in 'Phil. Mag.,' vol. xix. p. 1.

1842, 'Sixth Letter on Voltaic Combinations,' in 'Phil. Trans.,' 1842, p. 37.

1843, Second Edition of 'Introduction to Chemical Philosophy.'

1844, 'Additional Researches on Electrolysis,' in 'Phil. Trans.,' 1844, p. 1.

DANNECKER, JOHANN HEINRICH, was born at Stuttgart, Oct. 15, 1758. His father was a groom employed in the stables of the Duke Karl of Würtemberg, at Stuttgart, where his particular business was with the mules; and young Dannecker was brought up in a very humble manner. In 1764 his father was removed to Ludwigsburg, and here Dannecker, though then only six years of age, evinced signs of that talent for art for which he was afterwards so eminently distinguished. His first essays were flowers and soldiers, which he drew on any scrap of paper that came into his hands, or he scratched them upon stones. But these amusements of the child were, to his great annoyance, frequently interrupted by his mother, who used to send him occasionally some seven miles to fetch water from the mineral-springs of Cannstat. In 1771 however, in his fourteenth year, Dannecker entered, by the duke's desire, but against his father's wish, the school established at Ludwigsburg for the education of the children of the court-servants. He was first placed in the dancing-school, in which he became acquainted with four fellow-pupils who became the most celebrated of his countrymen in their respective lines —the sculptor Sheffauer, the engraver J. G. Müller, the musician Zumsteeg, and the poet Schiller. He made such progress in drawing in two years as to be removed from the dancing-school and placed in the school of plastic design, under the direction of the sculptors Bauer and Le Jeune, the modeller Sonnenschein, and the painters Harper and Guibal. In this school he remained three years, when, in 1780, in his eighteenth year, he obtained the prize for the best model of Milo of Croton destroyed by the lion; upon which he was appointed sculptor to the duke, with a salary of 300 florins per annum. In 1783 he went with Scheffauer on foot to Paris, and there studied under Pajou; after a two years' stay in Paris, the two friends departed together, again on foot, for Rome, where Dannecker remained until 1790, and contracted a friendship there with Herder, Göthe, and Canova. A Ceres and Bacchus which he executed in Rome were Dannecker's first works in marble: they are now in the palace at Stuttgart.

After 1790 Dannecker lived, with the exception of a few short intervals, wholly at Stuttgart; three of these intervals were occasioned—by a visit to Paris, to view the works of art collected together by Napoleon; by a visit to Zürich to model the bust of Lavater; and by another to Vienna, in the time of the congress in 1815, to model the bust of Metternich. He was professor of sculpture, and director of the School of Art, at Stuttgart; and inspector of the Royal Gallery of Ludwigsburg. He was offered, in 1808, the professorship of sculpture in the academy of Munich, which he declined. He died on the 8th of December, 1841.

Dannecker's works are chiefly executed in the round; there are few bas-reliefs by him, but those few are excellent: a predilection also for representing the female figure is a characteristic of his taste. He was likewise excellent in portraiture; he had a strong perception of individuality of character, and great facility in expressing it. His works however, during the course of his long career, evince the prevalence of a various taste in design in three different periods. At first his works were not marked by any particular originality of thought or excellence of design, but were conceived and executed in the spirit of such works as he had access to in Würtemberg or at Paris, and were in the taste of the French school. In Rome other styles were revealed to him, both in the works of Canova and in the antique, and his own works in a few years were characterised by a strong expression of the ideal, especially in the female form. The following works are eminently distinguished in this respect:—'Mourning Friendship,' executed in 1804 for the monument raised by Frederic, king of Würtemberg, to his minister, Count Zeppelin, at Ludwigsburg; the 'Ariadne reclining on a Leopard,' in the garden of M. Bethmann at Frankfort; and 'Cupid and Psyche' in the royal villa of Rosenstein near Stuttgart. His later works were more ideal in character than in form, and his object was to personify religious resignation. Of these his figures of Christ, John the Baptist, and Faith, are the most celebrated. His male figures however are effeminate, and in his Christ, meekness, more peculiarly a female quality, is the predominant sentiment.

Dannecker's greatest excellence was in his busts; he has left many interesting monuments in this branch of art, and foremost among them are the small and colossal busts of Schiller; the busts of Lavater, Gluck, the kings Frederic and William of Würtemberg, and other members of the royal family, and the medallions of Haug and Jung Stilling.

Dannecker ranks as one of the best of the modern sculptors, and his great merit seems to consist in a proper perception and representation of the finer and more gentle qualities of the soul, and of the more delicate characteristics of the human frame. His forms are true to nature, but uniform in character; and the sphere of his art is very circumscribed when compared with the comprehensive range of Canova. Dannecker never attempted, or at least never accomplished, the representation of manly vigour or robust masculine beauty; in the female figure however he was sometimes more natural, equally graceful, and less mannered or affected than Canova; but in his draperies he was frequently untrue. Instead of the natural and elegant folds which loose draperies assume on the human figure, he gave way to the conventional affectation of showing the exact form of the body beneath the draperies, as if they were wet, and adhered to it; producing an effect by no means beautiful, and, except when blown by the wind, unnatural; and in this case the parts not attached to the body must show a corresponding action.

An account of the life and works of Dannecker was published at Hamburg in 1841, with 25 lithographic prints of his principal works, from drawings by his pupil Wagner, likewise a celebrated sculptor. There is also a notice of Dannecker in the first and second numbers of the *Kunstblatt* for 1842.

DAPE'DIUM, changed by Agassiz to Dapedius, one of the first described British genera of fossil Ganoid fishes. To D. politum of De la Beche (*Geol. Trans.*, 2nd series, vol. i. pl. vi.) six others are added by Agassiz, all from the lias.

D'ARBLAY, MADAME, originally Miss *Frances Burney*, was born at Lynn-Regis, 13th June, 1752, and was the second daughter of Charles Burney, Mus. Doc., the author of the 'History of Music,' who was then organist in that town. Her mother, whom she lost when she was about nine years old, was partly of foreign descent, her maternal grandfather having been a French protestant, who left his native country on the revocation of the edict of Nantes. Madame D'Arblay has given her own account of her early life in her Memoirs of her Father. She there assures us that she was so backward when a child, that at the age of eight she was still ignorant of her letters. By the time that she was ten, nevertheless, she had begun of her own accord to exercise her talents in composition, and she was soon incessantly busy in scribbling 'elegies, odes, plays, songs, stories, farces, nay, tragedies and epic poems,'—her confidante at this date being her youngest sister Susannah. At fifteen she burned all her early performances; but one of them, the 'History of Caroline Evelyn,' kept possession of her memory and fancy, and gave rise to her conception of a sequel to it in the story of the daughter of her former heroine. This, we are told, was all 'pent up in the inventor's memory' before she committed any of it to paper; she then wrote down two volumes of it in a feigned hand, and employed her brother to offer them to a publisher. Dodsley declined the work as anonymous; Lowndes, as unfinished. Upon this she completed it by dictating to her brother a third volume; Lowndes gave her twenty pounds for the manuscript; and it was published under the title of 'Evelina; or, the History of a Young Lady's Introduction to the World.' The impression left upon the reader by this detailed account is, that 'Evelina' was written and published no very long time after the burning of the earlier story of 'Caroline Evelyn;' and, indeed, it used to be generally understood, and has been repeatedly stated, that Miss Burney was only about seventeen when this her first novel appeared. The fact is, that it was published in the year 1778, when she was six and twenty. She goes on to inform us that it was written and given to the world without the knowledge of any of her other relations except her sister and her two brothers; that she merely told her father, who used to employ her as his amanuensis (on which account she had employed the disguised hand in writing out the first two volumes), that she was going to print a little book; that the work had been six months published before he knew that it *was hers*; that she sat as a listener with the rest of the family while it was read through at a friend's house, whe
staying, without her concern in it being suspected
after a little time it began to make a great stir, pa
the favourable criticism of the Monthly Reviewer
hands of the beautiful Mrs. Bunbury, from her t
Mrs. Cholmoneley, from her to Reynolds, Burke
and Mrs. Thrale. By the time however that it rea
last, the authoress was known; and they were h
intimate friends, and naturally disposed to admire an
They appear, in fact, to have vied with one anot
enthusiasm with which they extolled the work,
the wonderful genius who had suddenly started
them. And 'Evelina' would, no doubt, have bee
respects a surprising production for a girl in her
year; but it is still more surprising upon the whol
a young woman in her twenty-sixth. Its most st
racteristic is the immaturity of mind which it di
girlishness of conception that pervades it, the w
power of penetrating beyond the outside shows a
things, the utter incapacity of appreciating motive
babilities, the childish absurdity of the whole constr
movement of the story, and of the conduct at ev
the persons figuring in it. There is fluency indeed
occasional vivacity, but the latter is nowhere bri
much of it is made up of mere hoydenish rattle an
jocularity, and often of insipid vulgar exaggeratio
lowest farce. This addictedness to caricature di
more or less all Miss Burney's novels. Her second
or the Memoirs of an Heiress,' appeared in 178
five volumes, and is a considerable improvement u
lina.' For more than a dozen years after the pu
'Cecilia' the fair writer laid aside her pen. In July
was appointed one of the Dressers or Keepers of
to Queen Charlotte, and this situation she held for
In July, 1793, she married M. Alexandre Piochard
a French emigrant artillery officer; and the same ye
lished an 8vo. pamphlet, entitled 'Brief Reflection
the Emigrant French Clergy.' In 1795 her traged
and Elgiva' was brought out at Drury Lane;
speedily withdrawn, and was never printed. The
she produced another five volume novel, 'Camilla
ture of Youth,' which she published by subscripti
realising, it is said, above three thousand pounds.
rated by her admirers so high as either of its pr
After the peace of Amiens, in 1802, her husban
went to Paris; and M. D'Arblay having given
hesion to the existing government, they remained
In 1812 however Madame D'Arblay found me
over to her own country; and she had thus the sa
again seeing her father, who survived till 1814, wh
at the age of eighty-seven. Her husband, no
D'Arblay, joined her at the peace; and they reside
till his death at Bath in May, 1818. Meanwhile
1814, published her fourth and last novel, 'The W
Female Difficulties,' in 5 vols., for which the books
to have given her 1500*l.*; but it met with little
is considered the poorest of her performances.
however for many years after this; and in 183
came before the world through the press with thr
lumes of 'Memoirs' of her father, Dr. Burney.
was unlike anything she had previously written,
manner as in subject; instead of the fluent, famili
her novels, she surprised her former readers, and
in general, by a pompous, indirect, long-winded,
diction, apparently intended as an improvement upo
or Gibbon, but having rather the effect of a ludicrous
intentional caricature. The book however contains m
esting anecdotes. In 1837 Madame D'Arblay lost h
only issue of her marriage, the Rev. Alexander Ch
D'Arblay; he was a fellow of Christ's College, C
and perpetual curate of Camden Town Chapel
had published several single sermons. Her own
lowed at Bath on the 6th of January, 1840. Since
volumes have appeared (in 1842) of her 'Diary an
edited by her Niece;' but, although the sixth volum
nounced as about to follow in December of the
it has not yet been published. It has however bee
announced as in the press. This Diary, though
it is frivolous enough, is on the whole an extreme
record, and the account which it presents of some d
of English life and society in the latter part of the la
is the amplest and most distinct that has anywhere b

(*Gent. Mag. for Aug.*, 1840; Madame D'Arblay'

AZ is a country in Asia in the valley of the river
ated north of its course between 37° and 38°
between 69° and 71° E. long. Its extent north-
perfectly known, as it borders there on the almost
ountry of Karategein. On the east of it are Shag-
oshan, and on the south Badakshan. It is an
ntry, consisting of a succession of high mountains
valleys; the mountains are so difficult of access,
ommunication between the valleys can only be
paths which do not admit of animals of burden of
Cultivation is extremely limited, but cotton is ex-
ltivated. It is made into cloth by the inhabitants,
utes the principal article of export, for which in
n and gunpowder are received. A small number
kept; and sheep and goats are numerous. There
rses. The natives of this country are Tajiks, and
n Sooni Mohamedans. Their language is Persian.
other small countries in the neighbourhood have
lled to submit to the authority of Murad Bey in
e Shah of Darwaz has been able to maintain his
ce, and the intercourse between the two sovereigns
o an exchange of presents. The Shah keeps up
of state, and a large force, large at least when
ith the troops of his weaker neighbours.
tone's *Account of the Kingdom of Cabul*; Wood's
f a Journey to the Source of the River Oxus.)

S CARO'TA, *Medical Properties of.* The
been sufficiently described [CARROT; DAUCUS,
medical purposes the root of the cultivated plant,
t (called improperly *seeds*) of the wild plant, are
former rasped down into a fine pulp is sometimes
, to chapped nipples, and even cancerous ulcers;
mmonly it is boiled, and beaten into a uniform
pplied as a poultice to fetid, sloughing, and other
ed sores, which it cleanses, and otherwise im-
pon what its power depends is not well ascertained:
f the root, analysed by Wackenroder, gave the
onstituents:—

stallizable sugar, with starch and c acid	93·71
en	4·35
oil (along with some volatile oil) .	1·00
a	0·34
containing alumina, lime, and iron .	0·60
	100·00

s a ruby-coloured substance occurring in four-sided
is tasteless, odourless, insoluble in water, soluble
and æther, also in fatty or fixed oils, which it
ow.
tile oil is colourless, of a peculiar penetrating
disagreeable taste. Thirty-four pounds of the
ield only half a drachm of oil. Probably the oil
s is similar. (Pereira.) The fruits of the wild
about one line and a half long, oval, flat, and
g the ridges with hairs. The odour is peculiar,
he taste aromatic and bitter. Their primary
rming and carminative; and in their secondary
are occasionally diuretic. They are seldom used.
the wild carrot is said to produce injurious effects,
be avoided.
vated carrot, particularly the yellow kind, contains
large quantity of starch. This is greatest when it
unmanured ground, exactly as wheat when raised
ed ground has more starch and less gluten
manured. The quantity in the carrot seems
ut the end of September. One hundred pounds
ht) of the fresh root then yield four and half
arch. It has been proposed to separate this starch
e manner as starch from potatoes, to employ it
as a very soothing and demulcent article of food
with pulmonary irritation and the cough which
r the influenza. It is most likely a very digest-
starch, but not more so than arrow-root. It may
t a cheap rate however, as any light soil will
as no manure is needed it cannot be expensive.
after the starch is extracted is good food for
should not be wasted. The white or Flemish
aluable food for cattle.
Flemish Farming.)

ANT, CHARLES, a writer on politics, political
d finance, was born in 1656, and was the eldest

son of Sir William D'Avenant, the poet. He studied at Baliol College, Oxford, and first made himself known by a dramatic piece, entitled 'Circe, a Tragedy,' to which Dryden wrote a prologue and Lord Rochester an epilogue, and which was brought out in 1675, but not printed till 1677. It was of an operatic character, like most of his father's productions in the same line, and of very little merit; as indeed Dryden intimates, with slight disguise, in his prologue. D'Avenant however did not pursue poetry, but applied himself to the study of the civil law; and he was some years after this made a Doctor of Laws by the University of Cambridge. Of his public employments, the first that is recorded is his appointment, in 1683, as one of the six commissioners to whom the superintendence of the Excise was delegated at this time, on that part of the revenue, which had for many years been let out to farm, coming again into the hands of the crown. In 1685 he was appointed Inspector of Plays, conjointly with the Master of the Revels; and that year also he was returned to parliament as one of the members for St. Ives. He was afterwards returned for Bedwin in 1698, and again in 1700; and on the 3rd of June, 1703, he was appointed Inspector-general of Exports and Imports, being the second person who had held that office, the first having been William Culliford, originally a custom-house officer in Ireland, who was appointed in 1696, and was now raised to be a commissioner of the customs. (Chalmers's *Historical View of the Domestic Economy of Great Britain and Ireland*, *Preface*, p. 10, edit. of 1812.) This office D'Avenant retained till his death, 14th November, 1714.

D'Avenant's publications on commerce, finance, and politics range over a period of about eighteen years. We will enumerate the more remarkable of them. 'An Essay upon Ways and Means of Supplying the War,' 1695. This tract immediately gained him considerable reputation for an acquaintance with the subject of the public finances; and for some years all his subsequent publications which he acknowledged were designated on the title-page as being by the author of the 'Essay on Ways and Means;' but he is believed to have been the author of several pieces upon which no such intimation appears. 'Discourses on the Public Revenues, and of the Trade of England,' Part I. 1698; and Part II. containing the Discourses 'which more immediately treat of the Foreign Trade of this Kingdom,' also 1698. To the first part is annexed a translation of Xenophon's 'Discourse on the Revenue of Athens,' by Walter Moyle, which is also printed in Moyle's collected works. The subjects discussed in the 'Discourses' are the use of political arithmetic, credit and the means of restoring it, the management of the king's revenues, the public debts, the general nature of foreign trade, the best way of protecting it, the plantation trade, and the trade with the East Indies. A reply was made to some things in the first part of this work, in 'Remarks upon some wrong computations and conclusions contained in a late tract entitled *Discourses*, &c.; in a letter to Mr. D. S.' 1698. 'A Discourse upon Grants and Resumptions,' 1700. This was written to recommend that certain late grants of crown lands, &c., should be resumed; and it was answered the following year in an elaborate treatise entitled 'Jus Regium; or, the King's Right to grant forfeitures, and other revenues of the crown, fully set forth,' &c. 'Essay upon the Balance of Power; the Right of Making War, Peace, and Alliances; Universal Monarchy,' 1701. This was another attack upon the government of King William, and was answered the same year in 'Animadversions on a late factious book entitled *Essays*,' &c. It was also formally censured by the Upper House of Convocation for a passage in which the author had declared that he could point out several persons whom nothing had recommended to places of the highest trust, and often to rich benefices and dignities, but the open enmity which they had, almost from their cradles, professed to the divinity of Christ. 'Essays upon Peace at home and War abroad,' in two Parts, 1704. To this piece he put his name; and, being now in office, he of course supports the existing government. He still however attached himself to the Tory party; and in 1710, in a work extending to two 8vo. volumes, entitled 'New Dialogues upon the Present Posture of Affairs, by the author of the Essay on Ways and Means,' he renewed an attack upon their opponents, which he is believed to have commenced many years before in an anonymous publication which appeared, in two successive parts, in 1701 and 1702, under the title of 'The True Picture of a Modern Whig.' His last performances were 'Reflections upon the Constitution and Management of the Trade to Africa' (anonymous), in three parts, fol. 1709; and two 'Reports to the Commissioners for putting in execution the Act for examining the Public Accounts of the kingdom,' 8vo. 1712. A selection of the political and commercial works of Dr. D'Avenant was published in 1771, in five vols. 8vo., by Sir Charles Whitworth, M.P., afterwards Earl Whitworth.

D'Avenant's writings are generally of some value for the information contained in them, and on some points he saw rather farther than the generality of his contemporaries; but he is a heavy writer, and was evidently (notwithstanding his poetical descent) a dull man, and as such (though the common notion is different) he was by no means a person to be trusted even in the handling and statement of facts. His notions upon the principles of trade and political economy also were very imperfectly systematised, and in some respects extremely immature; upon no one question perhaps is he more than partially right. He is as much behind his contemporary Sir Dudley North, for example, in the conclusions to which he had come, as if they had been separated by a century.

(*Biographia Britannica*, 2nd edit.; Craik's *History of British Commerce*, ii. 85, &c.; M'Culloch's *Literature of Political Economy*, pp. 351, 352.)

DA'VILA. [HENRICO-CATERINO DAVILA, P. C. S.]

DAYS OF GRACE. [BILL OF EXCHANGE, P. C.]

DEAN OF GUILD, in the municipal system of Scotland, is, as the title will naturally suggest, an officer of the merchant guilds, or societies of trading persons. An officer with this title used generally to be a member of the town council of every burgh, large or small; but by a clause in the Burgh Reform Act of Scotland (3 & 4 Wm. IV. c. 76, sec. 24), the functions of the dean of guild are appointed to be performed in each of the smaller burghs by some member of the council, chosen by the majority; and an officer chosen by the guildry, and entitled to sit as a member of the council, became peculiar to Edinburgh, Glasgow, Dundee, and Perth. In Edinburgh the dean of guild has by courtesy the title of lord, and there are current many ludicrous anecdotes, arising from the misapprehensions of persons not acquainted with the character of the office on hearing its holder thus addressed. By the act 1593, c. 184, the dean of guild was invested with extensive judicial powers in commercial questions, but this jurisdiction has long been in desuetude. His principal powers are now of an aedile character. They are consuetudinary—not fixed by any general law, but dependent on the local customs of the various towns, so far as these have not been checked in their divergence from a general principle by the decisions of the courts. The dean's authority is generally exercised in a court, of which he is the sole or the principal judge, according to local usage. His proceedings are sometimes conducted with the advice of a professional assessor. The character of his authority is thus defined:—'It belongs to the dean of guild to take care that buildings within burgh be agreeable to law, neither encroaching on private property, nor on the public streets or passages, and that houses in danger of falling be thrown down.' (1 Ersk. *Inst.* 4, 25.) In Edinburgh no building can be taken down or materially altered without the sanction of the Guild Court, which is given after all parties interested have been heard. Proprietors are compelled to repair or remove domestic edifices declared by the Guild Court to be, from disrepair or otherwise, dangerous to the public.

DE CANDOLLE, AUGUSTIN PY'RAMUS, was born at Geneva, where his father was premier syndic, in 1778, the year in which Haller, Linnæus, and Bernard de Jussieu died. His family originally came from Marseille, but had for more than two centuries been settled at Geneva. His earliest tastes were altogether of a literary kind, and from infancy he was distinguished for the ardour with which he pursued his studies. He was remarkable for the facility with which he wrote verses, a taste in which he indulged throughout life. In the year 1792, with his mother and brother, he sought refuge, whilst the French were besieging Geneva, in a village situated at the foot of the Jura. Here he amused himself in collecting wild plants and acquired a taste for botany, which, on subsequently attending the lectures of Professor Vaucher in his native city, became the occupation of his life. In 1796 he went to Paris, and attended the lectures of Vauquelin, Cuvier, and Fourcroy. He also became intimately acquainted with Desfontaines and Lamarck.

The first efforts of De Candolle in botanical science were rather directed to the observation of facts and the accurate distinction of species, than to the theories connected with the physiology or development of plants. His first publication was a description of succulent plants, delineations of which
were supplied by Redouté. He also drew up the de
for the magnificent work of the same artist on the
which was published in 1802. After a short wi
from Paris on account of the political state of Fr
returned again to Paris in 1804, and took his d
Doctor of Medicine. His thesis on this occasion wa
medical properties of plants. In this masterly ess
he subsequently republished, much enlarged, he dem
satisfactorily the close connexion that exists betw
sciences of botany and medicine, and which led
creasing attention to the structure and secretions of
affording at once the aliment of man in health and
cine in disease. In the same year he delivered, in
lege of France, a course of lectures on the principles
nical arrangement, of which he gave a sketch in t
duction to the third edition of Lamarck's 'Flora of
which was published in the following year. Thi
gives an outline of those principles of classification
after life became the basis of those great works on
fame as a botanist must principally rest. Althoug
every botanist had yielded to the influence of the
system of Linnæus, De Candolle, at this period,
estimated its merits. 'The natural method,' he
'endeavours to place each individual object in the
those with which it possesses the greatest number of
resemblance; the artificial has no other end than tha
bling us to recognise each individual plant and to
from the rest of the vegetable kingdom. The form
truly a science, will serve as an immutable foundation
tomy and physiology to build upon; whilst the secon
a mere empirical art, may indeed offer some conveni
practical purposes, but does nothing towards enlar
boundaries of science, and places before us an indefin
ber of arbitrary arrangements. The former, searchin
after truth, has established its foundation on the or
are of the greatest importance to the existence of plan
out considering whether these organs are easy or di
observation; the second, aiming only at facility,
distinctions upon those which are most readily exami
therefore present the greatest facilities for study.'

In the collection of plants De Candolle spared no
pains, and from the time of his being associated with
to 1812, travelled over every district of the then
possessions of France, for the purpose of examining
plants. In these excursions also he was frequently
by the government to report upon the state of agricu

In 1807 he was made Professor of Botany in the F
Medicine at the University of Montpellier. In
chair of Botany being constituted in the Faculty of
of the same place, he was appointed to it. Du
residence at Montpellier he devoted much time
botanic garden; and published a catalogue of th
contained in it, with descriptions of many new
Circumstances however occurred which led him to qu
pellier, and in 1816 he returned to his native city, w
restored to its independence on the re-establishmen
Bourbons on the throne of France. A chair of nat
tory was established especially for him at Geneva.
same year he visited England to examine the co
of plants in the British Museum, the Linnean an
societies, for the purpose of aiding him in the public
his great work on the vegetable kingdom.

In 1818 appeared the first volume of this work
to comprehend a description of all known plants.
fully prepared himself for the principles on which t
would be based by the publication of his 'Théorie
taire,' in 1813. In this work he not only carried
principles of a natural arrangement, of plants, which h
previously developed by Jussieu and Adanson, but by
extended study of the principles of morphology he
abled to clear up many of the difficulties which existe
grouping of plants in previous classifications. Whate
be the claims of previous writers in this department of
cal inquiry, to De Candolle must be conceded the
giving definite expressions for the various causes w
upon the structure of plants, and pointing out the rela
tween abnormal forms in individual plants and norm
in particular groups.

The natural system of the vegetable kingdom howe
only commenced, a second volume appeared in 1821,
author was obliged to abandon the design, as a wor
great magnitude. He therefore in 1824 commenc
publication of a Prodromus of the larger work. B

proved a work too extensive for completion during his ime. This work embraced descriptions of all the known ies of plants. Commencing with the phanerogamous ts, each order in the natural system was exhausted as far materials of the author would allow. All the orders nging to the polypetalous division of Exogens were com- ed, as well as the orders of the monopetalous division as s the Compositæ. To this last difficult order De Can- had paid much attention, and his desire to give it in as ect a form as possible led him to devote so much time to hat there can be little doubt that his health suffered se- ly from this cause alone. Although the work has been incomplete, yet the materials in the possession of De Can- still exist, and the work will probably be completed. importance of this publication to the working botanist hardly be overrated, as it supplies him with the means ecognising a vast number of species that had before been er undescribed or inaccessible to the student from the es in which they were published. Another point which ances the value of this work is the care which the author owed in drawing up the descriptions of plants, which could have been done so well by any one who possessed a less nsive herbarium and library than himself.

ut although the labour bestowed on this great work, and judgment with which it was executed, have given it the prominent position amongst his works, it can only be re- led as the result of an accurate knowledge of the structure functions of plants. On this subject he lectured for many s, and although frequently producing monographs on vari- departments of botany, which indicated his knowledge of etable anatomy and physiology, it was not till 1827 that he lished his 'Organography of Plants.' In this work he eeded on the principle of tracing each organ through all everal modifications of structure in the different plants in ch it occurs, and of reducing every part to its organic ents. It is thus not a mere detail of particular structures, a development of the great doctrine of metamorphosis, ich had been explained in his previous work on the prin- es of classification. This work was followed in 1832 by on the physiology of plants. This was a comprehensive est of all that had been done up to the period at which it written. It was however published at a time when the nist and the physiologist were both turning their attention the functions of the vegetable, as affording the means of er understanding the nature of the functions of the animal, d consequently many of the views of the author may be ted or proved to be erroneous.

r several years previous to his death, De Candolle red from ill health. In 1841 he was induced to visit the ting of naturalists held at Turin, in the hope that change limate would restore his failing powers, but he derived no fit from his journey, and died on the 9th of the following ember.

a botanist De Candolle must be placed in the first rank e century in which he lived. He possessed a quick ap- ension, which enabled him to make use of the labours of s, added to a habit of methodical arrangement, by which ould at once refer the various facts that came to his ledge to their proper position in the departments of the ce which he pursued. It was this which, combined with a and pleasing delivery, made him a successful lecturer, which enabled him to produce with rapidity so many s on botany. But he was not only a botanist; he was est in his sympathies with mankind, and was an active anthropist and energetic citizen. In Paris, in the part of his life, under the auspices of Benjamin De- rt, he took an active part in the formation of the Société anthropique of Paris, and the Society for the Encourage- t of National Industry was formed under his direction and agement. He was for many years a member of the legis- e body of Geneva, and also rector of the academy in the e place.

he following is an alphabetical list of his works :—

, 'Astragalogia, nempe Astragali, Biserrulæ, et Oxytro- is, necnon Phacæ, Coluteæ, et Lassertiæ Historia, Iconibus trata a Redouté,' fol. Paris, 1802. This work was an ac- nt of the Astragalus and some allied genera, and was illus- ed by Redouté.

, 'Catalogue des Arbres Fruitiers et des Vignes du Jardin anique de Genève,' Geneva, 1820. An account of the -trees and vines in the botanic garden of Geneva.

, 'Eloge Historique d'Aug. Broussonet,' 4to. Montpellier, 9. A memoir of Broussonet, a distinguished botanist.

4, 'Essai Elémentaire de Géographie Botanique,' 8vo. Paris, 1821. This was a reprint of the article on the Geography of Plants in the 'Dictionnaire des Sciences Naturelles.'

5, 'Essai sur les Propriétés Médicinales des Plantes, comparées avec leurs Formes extérieures et leur Classification naturelle,' 1804, 8vo. Paris, 1916. This was his inaugural dissertation on the medical properties of plants in 1804, which he republished in the year 1816.

6, 'Flore Française, ou Description de toutes les Plantes qui croissent naturellement en France.' The third edition of this work was edited by De Candolle. It was published at different times from 1803 to 1815, and contained a description of six thousand plants, and was accompanied by a coloured chart, indicating the distribution of plants throughout France.

7, 'Icones Plantarum Galliæ rariorum,' 4to. Paris, 1804. Figures of the rarer plants found growing in France.

8, 'Instructions Pratiques sur les Collections Botaniques,' 8vo. Geneva, 1820. A little work on the forming of botannical collections.

9, 'Mémoire sur les différents Espèces, Races, et Variétés de Choux et de Raiforts cultivés en Europe,' 8vo. Paris, 1822. This is a translation of a memoir which appeared in the 'Transactions of the Horticultural Society of London.'

10, 'Mémoires sur la Famille des Légumineuses,' 4to. Paris, 1825. Up to the time it was written it was by far the best monograph on the Leguminosæ. It was illustrated by seventy plates.

11, 'Notice sur l'Histoire et l'Administrations des Jardins Botaniques,' 8vo. Paris, 1822. This was a reprint of an article which appeared on the subject of botanic gardens in the 'Dictionnaire des Sciences Naturelles.'

12, 'Organographie Végétale,' 2 vols. 8vo. Paris, 1827. This work is a description of the organs of plants, and was published with the view of being an introduction to the physiology of plants. It contains sixty plates, representing the structure, normal and abnormal, of the various organs of plants.

13, 'Plantarum Succulentarum Historia,' 4 vols. 4to. and fol., Paris, 1799. This was a description of the various kinds of succulent plants, with illustrations by Redouté.

14, 'Plantes Rares du Jardin de Genève,' 4to. Geneva, 1825. An account of the rarer plants in the botanic garden of Geneva. It was published in parts, each part containing six plates.

15, 'Prodromus Systematis Naturalis Regni Vegetabilis,' 8vo. Paris and London, 1824 to 1845. Of this work seven volumes only are at present published.

16, 'Regni Vegetabilis Systema Naturale,' 8vo. Paris, 1818. This work, which was to have contained a full description of all the plants then known, was only commenced by De Candolle, and the Prodromus was published in its place.

17, 'Projet d'une Flore Géographique du Leman,' 8vo. Geneva, 1820.

18, 'Rapport à la Société de Lecture de Genève,' 8vo. Geneva, 1820.

19, 'Rapport sur la Fondation du Jardin de Botanique de Genève,' 8vo. 1819. A second report on the same subject was published in 1821.

20, 'Rapport sur la Question des Magazins de Subsistance, fait au Conseil Représentant de Genève,' 8vo. Geneva, 1819.

21, 'Rapport sur la Pomme de Terre, fait à la Classe d'Agriculture de Genève,' 8vo. Geneva, 1822. This was followed by two other reports on the culture and uses of the potato.

22, 'Théorie Elémentaire de la Botanique,' 8vo. Paris, 1813 and 1816. This was an exposition of the elementary principles of classification, and of the mode of studying and describing plants.

Besides the above works, De Candolle contributed papers to the Transactions of almost every scientific society in Europe, a bare list of which would far exceed the limits of this article.

(Daubeny, Dr., *Sketch of the Writings and Philosophical Character of A. P. De Candolle*; *Proceedings of the Linnean Society*, 1842; Bischoff, *Lehrbuch der Botanik*; Quérard, *La France Littéraire*.)

DECKER, SIR MATTHEW, BART., was born at Amsterdam in the latter part of the seventeenth century, of a Protestant family originally from Flanders, where his ancestors had been engaged in commerce till they were driven out in the Spanish persecution under the Duke of Alva, leaving their estates to their Catholic relations, some of whom long continued to occupy eminent positions in the municipal government at Brussels. Such was the account given by Sir Matthew himself to Collins, the genealogist, in 1727, as recorded by the latter in his 'English Baronetage,' iv. 185 (published in 1741). Decker came over to England in 1702; and he was naturalized the following year by the 28th private Act of the 2nd of Anne. Having settled as a merchant in London, he rose to great commercial eminence, was made a baronet in 1716, and in 1719 was returned to Parliament for Bishop's Castle. He only sat, however, in the House of Commons for four sessions, and his name does not occur in the reported debates. He married Henrietta, daughter of the Rev. Dr. Richard Watkins, rector of Wickford, in Warwickshire; and he died 18th March, 1749, when the baronetcy became extinct, and his estates devolved upon his three daughters. It is said to have been in the gardens of Sir Matthew Decker's country-seat at Richmond, in Surrey, that the pine-apple was first brought to maturity in England.

Decker is believed to be the author of a little work first published in 8vo. at London, in 1743, and entitled in the fourth edition, which appeared in the course of the following year, 'Serious Considerations on the several high duties which the nation in general (as well as its trade in particular) labours under; with a proposal for preventing the running of goods; discharging the trade from any search, and raising all the public supplies by one single tax. By a well-wisher to the good people of Great Britain.' In the seventh edition, which appeared in the same form in 1756, the tract is stated on the title-page to be 'By the late Sir Matthew Decker, Bart.' It consists in both these editions of only 32 pages. The author explains his object in p. 15: 'My proposal,' he says, 'in short, is this: that there be but one single excise duty over all Great Britain, and that upon houses.' He would in this way raise an annual revenue of 6,000,000*l.*, being as much as the ordinary expenses of the government then amounted to; with 1,000,000*l.* over to form a sinking-fund for the discharge of the debt. He calculates that in England, exclusive of Wales, there were then 1,200,000 houses; but of these he would tax only 600,000, counting off 500,000 as inhabited by the working and poorer classes, and 100,000 as uninhabited.

We do not know whether this scheme attracted much notice when it was first proposed, but, from the frequency with which it was reprinted, we may infer that it did. It was, at any rate, elaborately answered, soon after its republication in 1756, in a thick pamphlet of 120 pp., entitled 'The proposal commonly called Sir Matthew Decker's scheme, for one general tax upon houses, laid open, and showed to be a deep concerted project to traduce the wisdom of the Legislature, disquiet the minds of the people, and ruin the trade and manufacturies [sic] of Great Britain; most humbly submitted to the consideration of Parliament,' 8vo., Lond. 1757. The author of this attack is understood to be Mr. Joseph Massie, a fertile mercantile writer of that day. It is, as might be expected from the title, very angry, and even somewhat abusive. If there be any express personal allusion to Decker or recognition of him as the author of the scheme, beyond the mention of his name on the title-page, it has escaped our search. The author of the 'Serious Considerations' is commonly spoken of in some such style as the following:—'Certainly this man must have a front of brass, and a heart of flint' (p. 63).

Decker has also been commonly supposed to be the author of another more considerable work, first published in 4to. at London, in 1744, and reprinted in 12mo. at Edinburgh, in 1756, both editions without a name, under the title of 'An Essay on the Causes of the Decline of the Foreign Trade, consequently of the Value of the Lands of Britain, and on the means to restore both.' Adam Smith notices and comments upon this work as written by Decker, and designates the scheme of taxation advocated in it as 'the well-known proposal of Sir Matthew Decker,' in the fifth book of his 'Wealth of Nations.' It is very evident however that it cannot be by the author of the 'Serious Considerations,' for various reasons. As Mr. M'Culloch has remarked in his late work, 'The Literature of Political Economy,' page 328, 'the *impôt unique*, or single tax, proposed by the author of the "Essay" is quite different from that proposed in the "Considerations;" it is, in his own words, "one tax on the consumers of luxuries," or, as Smith has put it, "that all commodities, even those of which the consumption is either immediate or *very speedy*, should be taxed in this manner, the dealer advancing nothing*, but the consumer paying a certain annual sum for the licence to consume certain goods."'
added, that the edition of the 'Essay' published i
ushered in by a preface, evidently by the author, in
speaks of this as a second edition, which he had bee
to prepare by the public demand, and in which he
an opportunity of correcting some things in the
impression. Decker, as we have seen, died in 17
M'Culloch states, that in a work by Francis Fauquie
'An Essay on Ways and Means for raising Mone
support of the present War without increasing t
Debts,' third edition, 8vo. 1757, it is affirmed that t
on the Decline of Foreign Trade' was written
Richardson.

This 'Essay' is rather a remarkable work. B
main project for a single tax, which occupies abov
the 228 pages of which the volume (in the 12mo.
consists, he advances the four following proposals
abolish all our monopolies, unite Ireland, and put a
low-subjects on the same footing in trade; 2, To
the bounties on exported corn, and to erect public
of corn in every county; 3, To discourage idlenes
regulating our poor (he adopts Sir Josiah Child's pl
management of the poor, and would transport all ab
persons who cannot find employment); and 4, To p
debts by public bonds, bearing interest, and liquid
of our debts yearly. The balance of trade theory is
but many of the remarks are both just and ingenious.

DECLARATOR, ACTION OF, a form of
peculiar to the Court of Session in Scotland. Its
plains its nature, which is an action to have it
declared that a certain right, or a certain character,
a particular person or persons. It is not necessary that
who raises the action should demand any immedia
from the law, or that there should be any adverse
may be raised by persons in doubt how they ought
avoid the consequence of a breach of the law, and th
quently had recourse to by public officers. A pers
legitimacy is questioned, though no one may be a
ment denying his right to possess any property of w
gitimacy would deprive him, may bring an action of
of marriage and legitimacy to have his claim judic
blished. The principle of the declaratory conclusio
admitted into other actions where there are many
claims. The court lays down certain rules, applica
circumstances, by which the claims of individual pa
in the ultimate decision be tried. In cases of ext
settled claims in connection with bankrupt joint-s
panics this has been found a serviceable procedure. T
of declarator has been applied to many useful purpos
likewise, like some similar forms of procedure in ch
England, capable of abuse. It is sometimes very op
applied when a member of a public body claims so
cular privilege. An action of declarator is comm
the body at large, to which he is made a party, for th
of ascertaining whether he is entitled to act as he is d
he may thus be involved in expensive law proceedin

DEKKER, THOMAS. [Decker, Thomas,

DEL CREDERE COMMISSION. [Agent,

DE'LFICO, MELCHIORRE, born of a noble
Teramo, in the Abruzzo, in 1744, studied at Napl
Genovesi, Mazzocchi, and other learned teachers, an
himself particularly to the study of the law and o
economy. After his return to his native country he
his first work, an essay in defence of matrimony, aga
loose opinions of the time—'Saggio Filosofico nel Mat
1774. In 1782 he published a treatise on the adva
a provincial militia—'Discorso sul Ristabilimento del
Provinciale.' He next wrote a 'Memoria nella Co
del Riso Comune in Provincia di Teramo,' in which
mended the removal of the unhealthy rice grounds
neighbourhood of towns and villages, a suggestion w
approved of and acted upon by King Ferdinand. He
several memoirs against the laws restrictive of the tra
visions—'Memorie sul Tribunale della Grascia e su
Economiche nelle Provincie confinanti del Regno.' T
moirs being addressed to the king, had also the effect
ing the obnoxious restrictions on the sale and expo
rural produce. The government of Naples was at
disposed to useful reforms, and much was done to im
condition of the people, until the French revolution
when the Italian governments became suspicious and
change. Previous to that however Delfico continue
by his suggestions the progress of social improvem

ote, in 1787, a memoir against the abuse of the winter ansmigration of sheep from the high lands to the maritime tricts of the Abruzzo, by which a large tract of fertile land as kept out of cultivation—'Memoria sú i Regii Stucchi, sia sulla Servitú dei Pascoli Invernali nelle Provincie Marit me degli Abruzzi,' and soon after he published another trea se on the like practice in the plain of Apulia [CAPITANATA, P.C.]—'Discorso sul Tavoliere di Puglia,' 8vo. 1788. About the same time he wrote a 'Memoria sú i pesi e le misure del gno,' recommending a uniform system of weights and mea res throughout the various provinces of the kingdom of ples. His next work was in favour of the free sale of fiefs ich reverted to the crown at the extinction of baronial ilies—'Riflessioni sulla Vendita dei Feudi,' 1790, and Lettera al Duca di Cantalupo sú i feudi devoluti,' 1795. re again his recommendation prevailed, and a law was sed for the sale of feudal estates reverted to the crown as dial property.

Delfico also addressed to the king a 'Rimostranza,' or Me rial, by which he obtained the establishment of a 'Regia ienza,' or royal court of justice for the province of Teramo, ich till then was dependent on the court of Chieti. King rdinand made Delfico a Knight of the Order of Constan e. In 1799 the French invaded the kingdom of Naples, a few months after they were obliged to evacuate it. In midst of those blood-stained vicissitudes, Delfico thought rudent to emigrate, and he repaired to San Marino, where was inscribed among the citizens of that republic, and ere he waited for more peaceful times. In gratitude for hospitality which he there met with, he wrote the history hat little state from the documents which he found in its hives—'Memorie storiche della repubblica di San Marino colte dal Cavaliere Melchiorre Delfico cittadino della me sima,' 4to., Milan, 1804. When Joseph Bonaparte became ng of Naples, in 1806, Delfico was made Councillor of ate, and was also for a time intrusted with the management the home department. He contributed to the new judi ary organization of the kingdom and other useful measures, ong others to the establishment of the house for the insane Aversa, which has maintained its reputation, for its en ened philanthropic management, to the present day. On restoration of King Ferdinand, in 1815, Delfico was made sident of the Commission of the Archives. In 1823 he dered his resignation on account of his great age, and the allowed him a handsome pension for life. He left les, and returned to his native Teramo, where he con ued till 1835, when he died at the age of ninety-one. A years before his death, as the new king, the present Fer nd II., being on a tour through the provinces, repaired to amo, in 1832, Delfico, who in his youth had known his at grandfather King Charles Bourbon, the founder of the politan dynasty, caused himself to be carried to the pre se of his youthful king, who received him with marks of ect, had him seated by his side, and conversed long with

sides the works mentioned in the course of this article, fico wrote the following:—1, 'Ricerche sul vero Carattere a Giurisprudenza Romana, e de suoi Cultori, 8vo. 1791, a k that has been reprinted several times. 2, 'Pensieri su' toria e su' la Incertezza ed Inutilitá della medesima,' 8vo., li, 1806, also reprinted several times. These two works worthy of notice for a certain boldness and originality of ught which sometimes assumes the form of paradox. The hor speaks of tne antient Romans and their institutions and ners with great severity; he anticipates Niebuhr in his ticism concerning the legend of the early ages of Rome, he repeats the sentence of his countryman Vico, who said the Roman people, until the second Punic war, knew no er arts but those of digging the ground and cutting the ats of their neighbours. It is worthy of remark, that apolitan philosophers and critics have shown less classical eration for Rome than those of other parts of Italy, and ve exhibited more of a Samnite than a Roman feeling in storical investigations. 3, 'Dell' Antica Numismatica ittá di Atri nel Piceno con alcuni Opuscoli sulle Origini ,' fol., Naples, 1826, a work of much antiquarian and al erudition. 4, 'Memoria sulla Libertá del Com diretta a risolvere il Problema proposto dall' Acca i Padova sullo stesso Argomento,' inserted in the thirty olume of Custodi's great collection of the Italian eco . Delfico was an advocate of free trade. 5, 'Sugli i Confini del Regno,' written for the minister of the , but as yet inedited, like many other of his treatises and memoirs. 6, 'Espressioni della particolar Riconoscenza della Cittá e Provincia di Teramo dovuta alla Memoria di Ferdinando I.,' inserted in the second volume of the 'Annali Civili del Regno,' and being a recapitulation of all the improvements effected in that province under the reign of the elder Ferdinand, chiefly at the suggestion of Delfico.

(Tipaldo, *Biografia degli Italiani Illustri*; Mozzetti, *Degli Studii, delle Opere, e delle Virtú di Melchiorre Delfico*, Teramo, 1835.)

DELI'RIUM TREMENS, a disease of the nervous system, to which persons addicted to alcoholic drinks, though not exclusively, are peculiarly liable. As its name indicates, its principal symptoms are delirium and trembling. The delirium is a constant symptom; but the tremor is not always apparent, or does not exist. The delirium is always attended with sleeplessness: the patient is busy, and constantly talking, but is seldom or ever angry or violent. If he is questioned, he answers rationally, but speaks in an agitated and suspicious manner; he mostly does whatever he is told, and is frequently anxious to oblige. His thoughts, however, wander very quickly from objects around him, and he is apparently surrounded by the scenes of his imagination. Here, according to his occupation, he is busily engaged. If he is a master, he will order; if a servant, he will be anxiously obeying his master's commands. The sailor, the soldier, the coachman, all get busily engaged in their occupations. His thoughts are mostly distressful and anxious; he fancies he is in debt, that persons are persecuting him, that reptiles or animals are running after him; he looks suspiciously behind the curtains or door, or under the pillow, and wants to wander about. He seldom meditates harm either to himself or others. When there is tremor, the hands are fidgetty and the patient constantly wants to use them. In addition to these symptoms are others less observed; the tongue is moist and creamy, the pulse though frequent is soft, the skin is perspiring and emits a peculiar odour.

The disease with which this may be confounded is inflammation of the brain; and it is of the greatest importance that it should be distinguished, as the remedies that cure in the one disease will destroy in the other. Although delirium tremens does not invariably present itself in the drunkard, yet, when a person who drinks much alcohol presents many of the above symptoms, there is strong ground for believing it to be delirium tremens.

When the symptoms of this disease are obvious, its treatment is simple. The patient must have a sufficient quantity of opium administered to him to procure sleep; it should first be commenced in small doses, and then continued. A third of a grain of morphia may be given every two hours to begin with, and this may be increased to one or more grains. Generally, after a first sleep the patient becomes refreshed, and not unfrequently wakes up entirely well. Sometimes opium alone is not sufficient; this is the case where the disease has come on as the consequence of a cessation of an accustomed stimulus; in these cases it will frequently be necessary to let the patient have his ordinary beverage in order to prevent that degree of exhaustion which appears to keep up the irritability of the system. This remedy ought not, however, to be continued after the patient has acquired sufficient strength to do without it.

When the disease is about to terminate fatally, the delirium abates, and coma takes its place; the tremor of tne limbs becomes subsultus tendinum, the evacuations are passed involuntarily, the face becomes suffused, and the patient dies as though he were in apoplexy. The attacks of delirium tremens are very apt to recur, especially in drunkards who do not, after their first attack, give up the vice to which they are addicted. First attacks seldom prove fatal, but subsequent attacks are not uncommonly attended with fatal symptoms. After death from delirium tremens, the ventricles of the brain are usually found effused with serum. Serum, and even lymph, is also found occasionally under the arachnoid.

(Watson, *Lectures on the Practice of Physic*; Marshall Hall, *Diseases of the Nervous System*.)

DELIVERY. [DEED, P. C.]

DELORME, PHILIBERT, was born in 1518, at Lyon, where his father was a builder or undertaker of public works, in extensive practice. As he himself boasts, he was hardly fifteen when he had upwards of three hundred workmen to receive their directions from him; which probably means that such directions were only transmitted *through* him. Soon afterwards, he had an opportunity of displaying his precocity in a different field, for in 1533 he was sent to Rome, but his professed pursuits there engaged only a subordinate share of his attention, and what he most studied was to ingratiate himself with persons in power. Though in years a mere novice, he was a courtier by intuition, and in a very short time secured a protector in the Cardinal Santa Croce, who took him into his household. The devoutness which he now thought proper to affect far exceeded his application to study, which did not extend to more than making ordinary sketches. Yet if he did not profit much by diligence, he was favoured by accident in making what was then considered an important discovery, namely, that of the mode practised by the antients for tracing the Ionic volute, as described on a capital in Santa Maria Transtevere,—a discovery subsequently claimed for Palladio, although Delorme's prior right to it is neither to be disputed nor suspected, because the other did not visit Rome till 1549, nor begin to publish any of his writings till 1570, whereas the first edition of Delorme's works appeared in 1567.

On his return to his native city in 1536, Delorme, who brought back with him a high character for religious strictness, was employed to erect the portal of the church of St. Nizier, which, as far as it was ever finished, gives no very favourable idea of his architectural talent. The alterations of the Hôtel Billau, in the same city, obtained for him much more credit; but then, nearly the whole of it was due to his brother Jean. That work completed, he was soon afterwards summoned to Paris by Catherine de Médicis, to whom he had been recommended by the Cardinal du Bellay, who had himself been charged by Santa Croce (raised to the papal see in 1555, by the title of Marcellus II., but who wore the tiara only three-and-twenty days) to promote the advancement of his protegé. Catherine perceived in him other merits than those of a mere artist, and rewarded them accordingly. Although he was not in orders, having only received the tonsure when at Rome, several church benefices were conferred upon him, and he was appointed Aumônier du Roi. No wonder therefore, when rewards of that kind were showered upon him so unscrupulously, that he should have obtained much of the most important and lucrative employment in his own profession, without his qualifications being narrowly inquired into; and there is something flippantly extravagant in saying, as Milizia has done, that Delorme's talent was *discovered* by Henri II., and that he was one of the first to strip architecture in France of its Gothic dress, and clothe it in that of antient Greece. Delorme was associated with Primaticcio in the erection of the monument of Francis I., and that of the Valois princes at St. Denys (taken down 1719), but as they were designed by the Italian, he could have only a nominal share in the reputation derived from them as works of art. Among works of a more strictly architectural nature, he built the Château de Meudon for the Cardinal de Lorraine, and completed the Château de Madrid in the Bois de Boulogne at Paris; but his work at the latter building was inferior to that of his predecessors. To these may be added, the Court (*en fer de cheval*) at Fontainebleau, the royal seats of Villers-Cotterêts, de la Muette, and St. Germain-en-Laye, and the celebrated Château d'Anet, built for the Duchess de Valentinois, a lady far less distinguished by her title than by her name of Diane de Poitiers. Of these buildings, such as remain at all have been so altered at different times that their original character is nearly effaced; but of the Château d'Anet the portal or lofty centre compartment is preserved by having been taken down, and re-erected as a restoration, in the court of the Ecole des Beaux Arts at Paris. The reputation, however, obtained by that monument for Philibert is, Callet assures us, in reality due to Jean Delorme, his brother. Neither was Philibert's success altogether unmingled with vexations; there were those who ventured to murmur at Delorme as the creature of court favour, and to hint that he was rewarded more profusely than was altogether becoming even were his talents far greater. On the death of Henri II. (1559) he not only lost his appointment of Royal Aumônier, but fell into disgrace with the new king Francis II. Nevertheless the queen-mother continued her protection, and he was accordingly intrusted by her with the works of her new palace of the Tuilleries (1564). In the history of extensive edifices upon which different architects have been employed, whether nearly at the same time or at considerable intervals, there is generally a great deal of doubt and confusion; and as Bullant [BULLANT, P. C. S.] was also engaged upon the Tuilleries, it is far from certain which of them had the greater share in the original structure, more especially as we have seen that Philibert Delorme was not the man to be particularly scrupu taking as much credit as he possibly could to him sides which, the Tuilleries of Catherine de Médicis exists except in name, and the portion attributed t (the centre pavilion of the façade) has undergone su that it can no longer be recognised as the original. ing to Callet, it was Bullant who was the author of design of the palace, for Delorme, in the dedica works to Catherine (1567), takes credit to himself 'Ionic order' and some other minor parts, but caref mentioning the name of the other architect. What talent and taste really were, may be pretty well ju a specimen which no one will envy him the credit o the house which he erected for himself in the rue saie, and of which Callet exhibits two elevations and plan; for it is of studied inconvenience as a dwelling far from handsome as a design;—it is certainly no from 'antient Greece.' It was there that Philibert 30, 1577, at the age of fifty-nine.

As to his brother JEAN DELORME, no particulars him have come down to us, and no wonder, since that 'Jesuite de robe courte,' as Callet calls him, that he should be considered a mere nobody, and unworthy of notice. The probability is that Jean years before his brother, since otherwise the pruden latter might have deterred him from giving the understand what it was in the power of another to Even his writings show Philibert to have been more a charlatan and impostor,—addicted to base and flattery, and at the same time impudent throu acted modesty,—of which last one proof is his a readers that all the notes in his work bearing testim own ability were not written by himself, but by goo friends, and no doubt quite contrary to his own si victions. Besides other instances of quackery, he as to pretend not merely to have made improveme science of construction and stereotomy, but to hav discovered it by his own study and his knowledge of No doubt much useful practical information is to b his work entitled 'Nouvelles Inventions pour bi petit frais,' Paris, 1551, in regard to the carpentr and domes, but it is just as likely to have been deri from his brother as to have been the fruit of his assisted study. Like some of his contemporaries, Delorme might still be allowed to hold that rank which the courtesy of history concedes to those who great in their time and for their time, did he not unmasked to the world as a Tartuffe both in art and character.

(Callet, *Notice Historique sur quelques Architec çais du Seizième Siècle*, Paris, 1843.)

DELTHY'RIS. Dalman proposed this generic substitute for the Spirifera of Sowerby, but few writers Brachiopoda have adopted it.

DEMAND AND SUPPLY are terms used i economy to express the relations between consumptio duction—between the demand of purchasers and th of commodities by those who have them to sell. The between the demand for an article and its supply its price or exchangeable value [VALUE, P. C.]: the between the demand for labour and its supply deter amount of wages to be earned by the labourer [WAGE For causes explained elsewhere, the price of an ar rarely vary, for any length of time, very much above its cost of production;* nor will the wages of labou length of time, much exceed or fall below the amou sary to maintain labourers and their families in such as their habits of life have accustomed them to belie sary for their subsistence; but bearing in mind that prices of commodities and labour, there is a certa determined by causes independent of demand or supp or below which prices cannot materially vary for a derable time: all variations of price, if the medium they are calculated remains unchanged, may be refer proportion which exists between the demand for com and the supply of them—between the quantities wh chasers are willing and able to buy, and the quantiti producers are able and willing to sell.

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* "Cost of production" is used by political economists in a se from that of commerce, and includes profits. (See M'Culloch's Adam Smith, c. 7.) It means, in fact, the price below which [illegible] continue to sell his goods. An ordinary profit is a part of the duction in an enlarged sense, as much as the expense of wages and

To have any influence upon prices a demand must be accom- mied by the means of purchasing. A demand is not simply want—a desire to obtain and enjoy the products of other n's labour; for if this were its meaning, there would never the least proportion between demand and supply: all men ld always want everything, and production could not keep with consumption. But an 'effective demand,' as it is med by Adam Smith, exists wherever one man is anxious exchange the products of his own labour for that of other n. It is, therefore, of an effective demand only that poli- l economists are speaking when they examine the circum- nces of demand and supply in connexion with prices.

But although a demand, without the means of purchase, not affect prices, the universal desire of mankind to possess cles of comfort and luxury suggests other important consi- ations. As this desire is natural to man, and too often is trong as to tempt him even to commit crime, it obviously ds no encouragement: men will always gratify it when- r they have the means, and these means consist in the pro- ts of their own labour. Hence all that is required to con- t this desire of acquisition into an effective demand is ample ployment for industry. Increase the production of all modities and an increased consumption of them is the tain result; for, men having larger products of their own our to offer in exchange for the products of other men's r, are enabled to purchase what they are always eager to uire. Production, therefore, is the great object to be ured, not only as furnishing a supply of commodities neces- y and useful to mankind, but also as creating an effective and for them. When trade is depressed by a languid and, it is commonly said that increased consumption is all t is required to restore its prosperity. But how is this umption to be caused? The desire to consume is inva- ble, and thus any falling off in consumption must be attri- d to a diminished production in some departments of in- try which causes an inability to consume. When pro- tion is restored, an effective demand for all articles will ediately follow; but until the productive energies of the mers are in a state of activity it is in vain to expect from m an increased demand.

These considerations lead us to the conclusion that a uni- l glut of all commodities is impossible. The supply of icular commodities may easily exceed the demand for , and very often does exceed it; but as the constant e to obtain commodities needs nothing but the power of ng other commodities in exchange, to become an effective nd, it is evident that a universal increase of production essarily accompanied by a proportionate increase of con- ption. Men are stimulated by no love of production for own sake, but they produce in order to consume directly, because by exchanging their produce with others they are to enjoy the various comforts and luxuries which they all desirous of obtaining. Active production, therefore, ll departments of industry causes a general and effective and for commodities, which will continue to be equal to supply unless it be checked by war, by restrictions upon merce, or by other circumstances which prevent a free in- hange of commodities.

A country is in the highest prosperity when there is an ve and steady demand for commodities and labour, and a cient supply of them. Any disturbance of the proportion ween one and the other is injurious to the community; and injury is greater or less according to the extent and dura- of such disturbance. When the proportion is well ad- ed, the whole community derive benefit from the circum- nce, both as producers and consumers; when it is disturbed, y are injured in both capacities.

Having described thus generally the nature and causes of nand, and its intimate connexion with supply, it becomes essary to examine the influence of demand and supply upon e another, and upon production, consumption, prices, and ofits. This influence varies according to the circumstances the market, and the nature of the commodities to which its rs may be applied. These may be best understood by con- lering, 1st, the effects of a demand exceeding the supply; d, 2ndly, of a supply exceeding the demand.

1. The first effect of a demand exceeding the supply of a mmodity, is to raise its price. As more persons want to y the commodity than the producers are able or willing to pply, they cannot all obtain what they desire; but must are the supply between them in some manner. But their nts are very much regulated by the cost of gratifying them. One man would purchase an article for a shilling for which he may be unwilling or unable to pay two; while others, rather than forego the purchase, will consent to pay that amount. Those who have commodities to sell, finding that they have more customers than they can satisfy, immediately infer that they are selling them too cheaply, and that they could dispose of all their stock at a higher price. The price is accordingly raised, when the sale becomes limited to those who are not restrained from buying by the increased price. In principle, though not in outward form, the market is in the nature of an auction. The sellers endeavour to obtain the highest price for their goods; the price rises with the eagerness of those who wish to buy, and the highest bidders only secure the prizes. In the market, however, the competition of the buyers is not perceptible amongst themselves except through the prices demanded. Their competition determines the prices, but the sellers judge of its extent and regulate their demands so as to obtain the greatest possible advantage from it.

Some commodities are positively necessary for the support of the people, of which the supply may fall very short of the demand and be incapable of increase. This is the case when there is a bad harvest in a country which is excluded from a foreign supply by war or by fiscal restrictions. Here the price rises in proportion to the deficiency of the crops. The competition for food is universal. Some, indeed, may be driven to the consumption of inferior articles of food, and others to a diminished consumption; but all must eat. The number of consumers is not diminished, while the supply is reduced; and the price must, therefore, rise and continue high until a fresh supply can be obtained. In a siege the competition is still greater. The prices of provisions become enormous: the rich alone can buy; the poor must starve or plunder.

A similar effect is produced if the supply, without being deficient, be confined to the possession of a small number of persons, who limit it to the consumers in order to secure higher prices. However abundant corn might be in a besieged town, if one man were exclusively authorised by law to sell it, it might rise to a famine price, unless the people broke into the granaries, or the government interfered with the monopoly. Less in degree but similar in principle is the effect upon prices of every limitation of the market by fiscal restrictions. When any sellers are excluded, the others are enabled to raise their prices.

These are cases in which the supply cannot be increased to meet the demand, or in which the supply is monopolized. But the greater number of commodities may be increased in quantity, and the supply of them is not artificially limited. The price of these also rises when the demand exceeds the supply; but the increased price raises the profit of the producer and attracts the competition of others in the market. Fresh capital and labour are applied to the production of the profitable article, until the supply is accommodated to the demand, or exceeds it. The prices gradually fall, and at length the profits are reduced to the same level as the profits in other undertakings, or even lower. The encouragement to further production is thus withdrawn, and prices are adjusted so as to secure to the producers the ordinary rate of profits, and no more.

But sometimes the demand for a commodity is diminished, if the supply fall short of it for any considerable time. There are various articles useful and agreeable to mankind, but not essential to their existence, which they are eager to enjoy as far as they can, but for which they are not prepared to make great sacrifices. When the price of an article of this description is raised by a deficient supply, continuing for some length of time, it is placed beyond the reach of many persons who learn to regard it with indifference. They would buy it if it were cheap; but as it is dear, they go without it, or are satisfied with a substitute. In this manner the number of consumers is diminished. Others again, who will not be deprived of an accustomed luxury, enjoy it more sparingly, and consume it in less quantities. But so long as the supply is not increased, the price will continue high, because the consumers who still purchase the article, notwithstanding its price, keep up an effective demand equal to the whole supply; while there is still a dormant demand, only awaiting a reduction of price to become effective.

For the same reasons a demand for articles is diminished when their price is artificially raised by taxation. The demand is gradually confined to a smaller number of persons, and many consume more sparingly. [TAX, TAXATION, P. C.]

In these various ways demand and supply become adjusted through the medium of price, whenever the one exceeds the other. This is the result of natural laws, the operation of which is of the highest value to mankind. If the supply be incapable of increase, it economises consumption; if the supply can be increased, it encourages production. In either case it is of great benefit to the consumer. To revert, for a moment, to the example of a bad harvest in a country excluded from all foreign supply. Suppose that prices did not rise, but remained precisely the same as if the harvest had been abundant, what would be the consequence? The whole population would consume as much bread as usual, and use flour in every way that luxury points out, unconscious of any scarcity. Farmers might even feed their cattle with wheat. By reason of this improvidence the whole of the corn would be consumed before the next harvest, and the horrors of famine would burst, without any warning, upon a people living as if they were in the midst of plenty. This evil is prevented by a rise of prices, which is a symptom of scarcity, just as pain is a symptom of disease. By timely precaution the danger is averted. A high price renders economy and providence compulsory, and thus limits consumption. The supply, therefore, instead of being exhausted before the next harvest, is spread over the whole year. In the case of food, it is true that such economy is painful, and presses heavily upon the poor: but this evil is a mercy compared with famine. If no privation had been endured before scarcity became alarming, none but rich men could buy a loaf; for every one who had a loaf to sell would be risking his own life if he sold it.

These observations are also applicable in some measure to cases in which prices are raised by the supply being confined to one or to a few persons, who have contrived to buy up the whole or nearly the whole of any commodity. But such exclusive possession (sometimes improperly called a monopoly) cannot exist, for any length of time, in articles of which the supply is capable of increase. The extreme case has been put of a besieged town in which the whole supply of corn was monopolized by one man. Under those circumstances of course he would demand a high price; but unless his exclusive supply were upheld by law, it does not follow that the inhabitants would suffer on that account. A most provident consumption of food is absolutely necessary for the defence of a town, and no organization could distribute provisions according to the wants of the people so well as a system of purchase restrained by a high price. It must also be recollected that, without any such exclusive possession, the fact of the siege alone must raise prices by cutting off fresh supplies. If the siege continue, provisions are more likely to last out by the instrumentality of prices than by any other means. At the same time the sole possessor of the corn would be restrained from keeping back the supply beyond the actual necessity of the occasion by many considerations. He would know that if a popular tumult arose, if the town were relieved, the siege raised—a capitulation agreed to, or the place suddenly carried by assault—the value of his exclusive property would be destroyed. His own interest, therefore, is coincident with that of the people. It is better for both that the supply should be meted out with parsimony; it is dangerous to both that it should be immoderately stinted.

In circumstances less peculiar than these, very little evil can arise from an exclusive possession of any commodity not protected directly or indirectly by law. If the supply be capable of increase, and the demand be sufficient to enable the owner to secure a high price, for reasons already explained, the market would rapidly be supplied from other quarters. If the supply cannot be increased, that fact alone would raise the price; and it is probable that the supply would not have been so great without the extraordinary activity of the capitalist who had been able to secure for his country the whole accessible supply to be collected from the markets of the world.

A monopoly, properly so called, is of a totally different character: for however abundant the supply of an article may be, it may, nevertheless, be inaccessible to the consumer. [MONOPOLY, P. C.] Such monopolies were properly condemned so far back as the reign of James I. (21 James I. c. 3), although vast monopolies are still indirectly maintained by our fiscal laws. [TAX, TAXATION, P. C.] The legislature of this country however did not observe any distinction between a legal monopoly and the great speculative enterprises of commerce, miscalled monopolies; and severe penalties were inflicted both by the common and statute laws against offences called 'badgering, forestalling, regrating, and engrossing.' *The impolicy* of such laws was gradually perceived. If prices

were occasionally raised by speculations of this ki
restraints upon commerce, which resulted from
were infinitely more injurious to the consumer. M
statutes were therefore repealed by act 12 Geo.
but the common law, and all the statutes relat
offences of forestalling, regrating, and engrossing
erased from our commercial code until the year 184
8 Vict. c. 24).

When prices are high by reason of the demand
the supply, it is by no means necessary that the
those who sell the dear commodities should always
than the profits in other branches of trade. It m
be recollected, that where scarcity is the cause of h
the sellers who demand it have the less to sell.
scarcity is not the cause, but the demand is great b
supply, notwithstanding the exertions of the prod
not keep pace with it, the profits are undoubtedly g
usual, until the supply has been increased.

2. It is now time to consider the effects of a s
ceeding the demand; and this division of the in
require less elucidation, as the effects of such a c
the market may be stated to be the very reverse of th
we have just been examining. When there is more
modity than people are prepared to buy, its price
Its sellers must offer it for sale at the price at whic
induce people to purchase. All is now in favour of
They are no longer bidding against each other: but
are competing among themselves to get rid of th
The price falls generally in proportion to the ex
quantity, but this result is very much qualified by
of the article. If there be an excess of supply in
goods, there is nothing to prevent the natural fall
When fish is unusually abundant, it must be cheap,
part of it will be destroyed: it must be eaten at o
at all; and to induce people to eat it, it must be
them at a low price. But with articles which m
back, in expectation of higher prices, their value m
tially sustained. Production may be reduced, and
gradually brought into the market, until the supply
equalized with the demand; and wherever the arti
as to admit of voluntary increase or diminution,
result of an excessive supply is to reduce production
balance of supply and demand has been restored.
tual adjustment is in perpetual operation, and is
effected with such precision, that it may be said, w
aggeration, that a large city is supplied exactly w
thing its inhabitants require—even down to an eg
of milk. There is always enough of everything,
too much.

Whenever there is an excessive production of
modity, it is an evil almost as great as scarcity. It i
the consumer derives benefit from it, but the produc
are most injuriously affected. In order to raise th
the produce of their labour, they must cease to p
must produce in less quantities. The workmen are
deprived of employment altogether for a time, or are
for a portion of their time only, at reduced wages; w
employers are disposing of their goods at low pric
scarcely repay the outlay of their capital. Nor
penalty of over-production fall exclusively upon thos
in the trade in which supply has exceeded the deman
distresses extend to other classes. It has been show
that it is to production we must look as the cause of
consumption, and thus the pressure upon any co
branch of productive industry must be sensibly felt
who have the produce of their own labour to sell.
tion has failed, and consumption must therefore be di

The ruinous consequences of gluts, in particular
trade and manufacture, are too well known, especial
country, to require any further illustration; but th
are not always agreed upon. Such gluts are often
to the facility with which manufactures are pro
machinery; but we have shown that over-producti
branches of industry is impossible, and if that be
evident that when partial gluts are produced by
machinery, that powerful agent must have been mi
It is not contended that nothing can be produced in
abundance. Whether machinery be used or not, p
must be governed by the same laws of demand an
Those things only must be produced for which t
demand, and they must not be produced in greater a
than the demand warrants. But the more generally m
is used, the more abundant will be the products w

ll have to exchange with each other, and therefore the tter will be the market. It follows that machinery can only se a glut when applied excessively to particular objects, ecisely in the same manner as an excessive quantity of bour would cause one if applied where it was not needed by e demands of commerce.

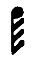
The supply of markets is a very speculative business, and is ten conducted with more zeal than discretion. When a par-ular trade is supposed to be more prosperous than others, pitalists rush into it in order to secure high profits; and in s country the abundance of capital, the perfection of our chinery, and the skill of our workmen, enable them to pro-ce with extraordinary facility. Over-production in that rticular trade is the consequence, and all engaged in it suffer m the depreciation in the value of their goods; but if, tead of rushing into the favourite trade, they had distributed ir enterprises more widely, their own interest and that of e community would have been promoted. When a ship is ecked, if all the crew precipitate themselves into one boat, y swamp it; but if they wait till all the boats are lowered, d apportion their numbers to the size of each, they may all ch the shore in safety. And so it is in trade: one trade y easily be glutted, while there is room in other trades for the capital and industry that need employment.

In proportion to the extent of the market and the variety d abundance of commodities to be exchanged, will be the ity of disposing of the products of capital and labour; and s consideration points out as the most probable antidote to s a universal freedom of commerce. When the free inter-nge of commodities is restricted, not only is a glut caused re easily, but its causes are more uncertain, and dependent on unforeseen events. With the whole world for a market, operation of the laws of demand and supply would be re equable, and the universality of the objects of exchange uld make gluts of rare occurrence. The market would still liable to disturbance by bad harvests, by errors in the etary system, by shocks to public credit, and by war; but rt from these causes of derangement, demand and supply ld be adjusted, and the productive energies of all nations d into full activity.

(Adam Smith, *Wealth of Nations*, book i.; M'Culloch, *nciples of Political Economy*, part i. ch. 7, and part ii. 1, 2; Malthus, *Principles of Political Economy*; Ricardo, 30; Mill, *Essays on Unsettled Questions of Political nomy*, Essay ii.)

DEMESNE. [MANOR, P. C.]

DEMISEMIQUAVER, a musical character, formed by ng three hooks to the stem of a crotchet, Ex.—



in length, or duration, is equal to $\frac{1}{32}$ of a semibreve. [SE-BREVE, P. C.]

DEMPSTER, THOMAS, was the son of Thomas Demp-, of Muiresk, in Aberdeenshire, where he was born, on 23rd of August, 1579. His life is a series of strange ad-tures, where the literary triumphs of the wandering scholar mingled with fierce controversy and occasional deeds of ed violence. His wild career seems to have commenced he centre of his domestic circle, of the morality of which gives a startling picture, telling how one of his brothers taken to wife his father's concubine, collected a band of ans, with whom he surrounded and attacked that father his attendants; afterwards fled to Orkney, where he ded a band of freebooters, who, among other violences, ned the bishop's palace, and ended his career as a soldier the Netherlands, where he was put to death as a criminal being torn limb from limb by wild horses. Thomas mpster commenced his classical studies at Pembroke Hall, mbridge, at the age of ten, and completed his education at ris, Louvain, and Rome. He took the degree of D.C.L., was made regent in the college of Navarre, in the Uni-sity of Paris, at a time when, according to his own account, must have been but seventeen years old. The history of various wanderings from university to university, his literary tests, and his personal quarrels, is too lengthy to be fol-ed out on this occasion. Being at one time left by the ncipal of the college of Beauvais, in the University of is, as his *locum tenens*, he caused a student of high and erful connections to be ignominiously flogged. Several tives took up the student's cause, and made an armed ck upon the college; but Dempster showed that he had urces equal to the occasion: he fortified his college, stood a sort of siege, and concluded the affair by taking some of the belligerents prisoners and confining them in the college belfry. After this affair he fled from France. At the beginning of the year 1616 he was in England, where he married Susanna Waller, a woman whose disposition appears to have been of a no less hardy and reckless character than his own. Some time afterwards, when he was passing through the streets of Paris with this woman, her dazzling beauty and the degree to which she exposed her person, brought on them the dangerous attentions of a mob of followers, and compelled them to seek refuge in an adjoining house. Afterwards, while Dempster was teaching the belles-lettres in the University of Bologna, where he seems to have involved himself in a more than usual number of disputes, he found that his wife had eloped with either one or more of his students. After an ineffectual attempt to overtake the fugitives, he died at Butri, near Bologna, on the 6th of September, 1625, the victim apparently of overwrought energies and a broken spirit. Dempster's works are more celebrated for their profuse miscellaneous learning than their critical accuracy. They are very numerous. Dr. Irving, in his 'Lives of Scottish Writers,' gives a list of fifty, stating that the list is as complete as he has been able to make it. His 'Antiquitatum Romanarum Corpus absolutissimum,' an edition, or rather an enlargement, of the work by Rosinus, bearing that title, published in 1613, is well known. There are many editions of it, and it forms, both in the substance and illustrations, the foundation of Kennet's and other popular books on Roman antiquities. His 'De Etruria Regali,' left in MS., was magnificently edited in 1723-4, in two volumes, folio, by Sir Thomas Coke. His 'Historia Ecclesiastica Gentis Scotorum' was published at Bologna in 1627, and was reprinted for the Bannatyne Club in 1829. It is simply a biographical dictionary of Scottish authors, and as such has been often referred to in this work. In many instances its information may be depended on, but whoever consults the work must bring with him some previous critical knowledge of the subject, as the author is very prone to exaggerate the literary achievements of his countrymen. He not only makes out to be Scotsmen persons whose birth-place is the subject of doubt—*e. g.* Joannes de Sacrobosco, Erigena, &c., but also includes such names as Egleshum, Fust, St. Fiacre, St. Novatus, Pelagius, and Rabanus Maurus, who are well known not to have been natives of Scotland.

DE'NDRODUS, a genus of Placoid fishes, from the old red-sandstone of Elgin, Moray, and Russia. Professor Owen described five species, and Agassiz admits a sixth. (*Reports of British Association for* 1842.)

DENI'NA, CARLO GIOVANNI MARIA, born in 1731, at Revello in Piedmont, studied at Saluzzo and Turin, took priest's orders, and was made professor at Pinerolo. Having discussed rather freely, in a play which he composed, the various systems of education, he incurred the dislike of the Jesuits, who had at that time the monopoly of education, and he was dismissed from his chair. Repairing to Milan, he wrote a work, 'De Studio Theologiæ, et Norma Fidei,' 1758, which was much approved of, and the author was soon after recalled to Piedmont, and was appointed professor of humanities and rhetoric in the High College of Turin. He then began his work on the revolutions of Italy, which is a general history of Italy from the Etruscan times to the beginning of the seventeenth century: 'Istoria delle Rivoluzioni d'Italia,' in 24 books, to which he added afterwards a 25th book, which brings the narrative down to 1792. This was the first general history of Italy, with the exception of the 'Annals' of Muratori, and although it is at times deficient in sound criticism, it is not destitute of merit. The work has been translated into almost all the European languages. In 1777 Denina went to Florence, where he published anonymously his 'Discorso sull' Impiego delle Persone,' which was intended as a reply to certain charges brought against his historical work by ecclesiastical critics, because Denina had censured the abuses of monastic institutions, and had questioned the propriety of binding a vast number of persons to celibacy. There was a law in Piedmont by which any native of that country was forbidden to publish a book, even in a foreign country, without the previous sanction of the Turin censorship. Denina was in consequence deprived of his chair, and banished to his native town. The archbishop of Turin however took up his defence, and he was allowed to return to the capital, where some time after he received, through the Prussian envoy, an invitation from Frederic II. to repair to Berlin, for the purpose of writing a work on the revolutions of Germany. Denina accepted the offer, and repaired, in 1782, to Berlin, where he remained many years, and where he composed his 'Rivoluzioni della Germania,' and also 'La Russiade,' being a panegyrical history, in poetical prose, of Peter the Great. He also wrote a work in French on Prussian literature, 'La Prusse Littéraire sous Frederic II., ou histoire abrégée de la plupart des auteurs, des académiciens, et des artistes qui sont nés ou qui ont vécu dans les Etats Prussiens depuis 1740 jusqu'en 1786, par ordre alphabétique,' 4 vols. 8vo., Berlin, 1790-91. He also wrote an 'Essai sur la Vie et le Regne de Frederic II.' In 1792 Denina revisited Italy, and after his return to Berlin he wrote 'Considérations d'un Italien sur l'Italie,' in which he gave an account of the contemporary literature of his native country, for the information of the philologists of Germany. Another and a more important work is his 'Vincende della Letteratura,' 4 vols. 8vo., in which he sketches with concise but clever touches the progress and vicissitudes of the literature of the various nations of Europe. The book displays a vast extent of bibliographical erudition.

In 1804 Denina was introduced to Napoleon at Mainz, to whom he dedicated his 'La Clef des Langues, ou observations sur l'origine et la formation des principales langues de l'Europe.' Soon afterwards he was appointed imperial librarian. He then removed to Paris, where he wrote his 'Istoria dell' Italia Occidentale,' being a sort of supplement or continuation of his 'Rivoluzioni d' Italia.' It is a history of Piedmont and Liguria, and contains much information derived from the local chronicles and documents, which Denina had consulted while he lived in his native country. He also wrote 'Tableau historique, statistique, et moral de la Haute Italie,' which was afterwards translated into Italian. Denina died at Paris, at an advanced age, in December, 1813. Besides the works above mentioned, he wrote many minor ones, among which the following are deserving of notice:—1, 'Guide Littéraire,' being a sketch of the Prussian monarchy, and of its civil and literary institutions. 2, 'Della Lodi di Carlo Emmanuele III., Ré di Sardegna.' 3, 'Elogio storico di Mercurino di Gattinara, Gran Cancelliere dell' Imperatore Carlo V., e Cardinale.' It contains a sketch of the condition of Spain under Charles V. 4, 'Elogio del Cardinale Guala Bicchieri,' who was papal legate in England about A.D. 1222. 5, 'Réponse à la question: que doit on à l'Espagne?' Berlin, 1786, and afterwards translated into Spanish. It is a reply to some harsh judgments upon Spain in the article 'Espagne' in the 'Encyclopédie Méthodique.' Denina shows that Spain has contributed more than is generally supposed to the European stores of sciences, letters, and fine arts. 6, 'Essais sur les traces anciennes du Caractère des Italiens modernes, des Sardes, et des Corses.' Denina was a great supporter of the theory of the influence of climate on the character of nations. 7, 'Bibliopea, ossia l'Arte di compor Libri.' 8, 'Istoria politica e letteraria della Grecia libera,' which ends at the death of Philip, father of Alexander.

(Ugoni, *Della Letteratura Italiana nella seconda metà des Secolo XVIII.*; Barbier, *Notice sur la Vie et les principaux ouvrages de Denina*, in the 'Magazin Encyclopédique' for January, 1814.)

DENNER, BALTHASAR, a celebrated German portrait painter, distinguished above all other artists for the elaborate finish of his works; their extraordinary finish however is their chief merit. Of Denner's early life little is known; he was born in Altona in 1685, and lived some time with a painter at Danzig; after having distinguished himself at the courts of several German princes, he came by the invitation of George I. to London. He spent a few years in England, but his success here was not what he had anticipated; he excited more surprise than admiration, and he left this country in 1728. After performing various journeys in the north of Europe, he died rich at Rostock, in Mecklenburg, in 1749, or, according to Van Gool, at Hamburg in 1747. Though Denner bestowed more labour upon his pictures than any painter probably ever did, he still contrived to paint a considerable number; some are however more finished than others, but some are finished with a degree of attention to the minutiæ incredible to those who have not examined them. Yet in a personal inspection, in some cases, recourse to the magnifying glass is said to be necessary, to do justice to his laborious execution. There is the head of an old woman in the gallery of Vienna, for which the Emperor Charles VI. gave him 4700 imperial florins; Denner's own portrait in his forty-second year, in a similar style, is placed near it. There are also two old heads of extraordinarily high finish in the gallery of Munich, said to be the portraits of the artist's father and mother. Denner painted many of the German princes of his day, and three kings, one of whom, Frederic IV. of Denmark, he painted, according to Van Gool, abo twenty times; the other two were Peter III. of Russia, a Augustus II. of Poland.

(Van Gool, *Nieuwe Schouburg der Nederlantsche Kun schilders*, &c.)

DENON, DOMINIQUE VIVANT, BARON, w born of a noble family at Châlons-sur-Saône, in 1747. Thou from his early youth his bias was for the arts of design, he some years devoted himself to them as an amateur only, y he was early distinguished for his taste and judgment in ma ters of *virtù;* Louis XV. employed him to make a collecti of antique gems for Madame Pompadour. He commenc however his active career in life as a diplomatist, and was fi attached to the Russian embassy. Upon the accession of Lo XVI., he found a valuable patron in the minister for forei affairs, the Comte de Vergennes, who sent Denon on a missi to Switzerland, when he took the opportunity of visiti Voltaire at Ferney, and drew a portrait of him, which w engraved by St. Aubin. He was next sent by his patron t Naples, as secretary to the embassy under the Comte Cl mont d'Amboise. He lived seven years at Naples, and devoted much of his time to the study of the arts, especiall etching and mezzotint engraving. He also at Naples serv two or three days in the capacity of Chargé d'Affaires d France, in the interim between the resignation of M. Cle mont d'Amboise, in 1782, and the arrival of his successor, M de Talleyrand. The death of the Comte de Vergennes however put an end to Denon's diplomatical career, and he thenc forth adopted the arts of design as his profession. He remove from Naples to Rome, and arrived in Paris in 1787. Here through the influence of his friend Quatremère de Quincy he was elected a member of the Royal Academy of the Arts his presentation work was an insignificant etching of t Adoration of the Shepherds after L. Giordano. He returne to Italy, spent five years at Venice, and some time at Florenc he then visited Switzerland, where he learned that his property had been sequestered, and his name enrolled in the list o emigrants. Notwithstanding this threatening state of hi affairs, he ventured to make his appearance at Paris, whe but for the assistance of David, he would have been destitute David contrived to have his name erased from the list o emigrants, and procured him an order from the governmen to design and engrave a set of republican costumes. He wa engaged in this occupation during the horrors of th Revolution.

After the more violent features of the Revolution had sub sided, the house of Madame Beauharnois was a centre of attraction where the most distinguished men in politics, ar literature, and science frequently met; and here Denon became acquainted with Bonaparte, whose exploits had already commanded the admiration of all. Denon was a most devoted admirer of the great general, and when Napoleon asked him in 1798, to accompany him on his expedition to Egyp Denon, though in his fifty-first year, embraced the opportunity with the utmost enthusiasm. He accompanied Gener Desaix in his expedition into Upper Egypt, and during th whole stay of Napoleon in the East he was indefatigable i drawing all the most interesting and striking Egyptian mo ments. He returned with Napoleon to France, and in th short space of about two years published his great work o Egypt—'Voyage dans la Basse et la Haute Egypt, pendant les Campagnes du Général Bonaparte,' 2 vols. folio, 1802; a second edition in 4to. was published in the same year, and a smaller edition in 1804. A very elegant quarto edition wa published in London, in 1802, by M. Peltier, with several appendices by various members of the Egyptian Commission, or 'Institut du Caire,' in addition to Denon's journal, the original text. This work, which, as the production of a individual, is a noble monument of zeal, industry, and ability, is professedly simply descriptive of what Denon saw and wha happened to him; he designedly abstained from all hypothesis, whether with reference to origin, object, or principle. Abou the time of the publication of this work, Denon was appointed by Napoleon directeur-général des Musées, a post of gre influence; but he was deprived of it at the Restoration. Afte his retirement, he occupied himself in preparing a gener history of art, for which he prepared, by the assistance of abl artists, many lithographic drawings, but he did not live t complete the text. The incomplete work was published b his nephews, in 1829, in 4 vols. folio, under the title 'Mon mens des Arts du Dessin, chez les peuples, tant anciens q modernes, recueillis par le Baron de Denon, pour servir l'Histoire des Arts,' &c. Denon died at Paris in 1825.

n's etchings are numerous, amounting to upwards of
ey are chiefly in imitation of the style of Rembrandt,
sist of portraits, historical and *genre* pieces, from
nd Flemish masters. Besides his Voyage in Egypt,
thor of the following literary productions:—'Julie,
on Père,' a comedy in three acts, 1769; 'Voyage en
h Malte,' 1788; 'Discours sur les Monumens d'An-
arrivés d'Italie,' 1804; several biographical notices of
in the 'Galerie des Hommes célèbres;' and 'Point de
ain,' a tale, 1812.

as Membre de l'Institut, of the class of fine arts,
f the Legion d'Honneur, and knight of the Russian
St. Anne, and of the Bavarian crown. He was
Baron by Napoleon.

stblatt, 1825; *Biographie Universelle, Suppl.*)

TA'RIA, a genus of plants belonging to the natural
ruciferæ, the sub-order Siliquosæ, and the tribe Ara-
It has a lanceolate compressed pod, flat nerveless
a capitate stigma; the seeds in a single row, the funi-
lated, winged. The Coral-wort, *D. bulbifera*, is the
itish species of this genus. It has a simple stem,
leaves, the lower leaves pinnate, the upper leaves
the axils of the leaves producing bulbs. It has a thick
izoma with tooth-like knobs, hence its name. The
are rose-coloured or purple. It is a rare plant in Eng-
ut it is found in the neighbourhood of Tunbridge
(Babington, *Manual*.)

UNCIATION. [Diligence, P. C. S.]

DARA. [Abies, P. C., p. 34.]

ARTURE. [Pleading, P. C.]

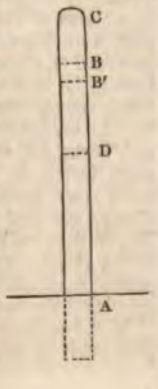
OSIT. The term is applied to the sum of money
nder 43 Geo. III. c. 46, a man might deposit with the
fter he was arrested, instead of putting in special bail.
ount of the deposit was the sum sworn to on the back
rit. (Blackstone's *Comm.* iii. 290.)

sit is also used for any sum of money which a man puts
ands of another as a kind of security for the fulfilment
agreement, or as a part payment in advance.

Roman word depositum signified anything which a man
he hands of another to keep till it was asked back,
anything being given to the depositarius for his
The depositor was called deponens or depositor.
positary was bound to take care of the thing, and to
od any damage that happened to it through fraudulent
(dolus) or gross neglect (lata culpa). The depositor
ecover the thing by action; but the depositary was
to satisfaction for any loss that he sustained in the
f the deposit by any default (culpa) on the part of the
r. The depositary could make no use of the deposit,
with the permission of the depositor, either given in
words or arising from implication. If a man refused
n a deposit, and was condemned in an action of
(actio depositi), infamy (infamia) was a consequence
condemnation.

16, tit. 3; Juvenal, *Sat.* xiii. 60.)

RESSION OF MERCURY is intended, here, to
the diminution of the height of the column of mercury
ibe of a barometer in consequence of a small quantity
hich, from accidents in carriage or otherwise, may get
pper extremity of the tube and there act, by its elas-
n the head of the column. When the barometer is
nployed in determining the relative heights of ground,
ot be possible to get this air out of the tube by any
n the power of the observer, and it then becomes ne-
to have a formula by which a correction may be ap-
the observed height of the mercury at any station, in
have the height at which the top
olumn would stand if the tube were
n air.



his purpose, before setting out, the
of the column of mercury in the
e instrument must be compared
height in one which is perfect, in
obtain the measure of the elasticity
ir which is confined in the upper
y of the tube. Let AC be the
f the bore of the tube above A, the
of the mercury in the cistern, AB
ght of the column in a barometer
n air, and AB′ the observed height
lefective instrument. It being un-
l that these heights are read at the
ne and place, so that the temperature
and density of the air may be the same; and also that both instruments are provided with adjusting screws so that the surfaces of the mercury in the two cisterns may be made to coincide with the zeros of the scales of inches. Then the pressure of the external atmosphere supporting the column AB, and the difference between that pressure and the pressure equivalent to the elasticity of the air in CB′ supporting the column AB′; it follows that the weight of a column of mercury in BB′ measures the pressure last mentioned: let this be represented by ml, in which l is equal to the height BB′.

Now, on removing the instrument to another, suppose a higher, station, let the observed height of the mercury in the imperfect barometer (no more air being supposed to have entered) be AD; then the air which, before, occupied the space CB′, occupies CD, and its elastic force is diminished in the inverse ratio of those spaces or heights; therefore, if CB′ be represented by a, and CD by b,

$$b : a :: ml : m\frac{al}{b};$$

and the last term expresses the pressure of the confined air on D, the top of the column of mercury. This term added to the weight of the column of mercury AD, which may be represented by mh (h being the observed height AD) will be equal to the weight of the column of mercury at the same time and place in a barometer which is free from air. This last being represented by mh'; it follows that $h' = h + \frac{al}{b}$, or $\frac{al}{b}$ is to be added to the observed height in order to obtain the corrected height of the column of mercury at the station.

DERCÆA. [Stenylytra, P. C. S.]

DERME'STIDÆ (from δερμηστής, a moth or worm that eats skins), a tribe of pentamerous coleopterous insects, belonging to the family of *Clavicornes*. It includes the genera *Aspidiphorus*, *Dermestes*, *Megatoma*, *Attagenus*, *Nogoderma*, *Anthrenus*, and *Globulicorne*. The species of the typical genus, *Dermestes*, are harmless insects in their perfect state, living on flowers, but whilst in the condition of larvæ they are most destructive creatures and great pests to the naturalist from the mischief they do among his collections, more especially of skins. They are distributed through Europe, New Holland, Africa, and America.

DERRICK, SAMUEL, whose name occupies an obscure place in the literature of the eighteenth century, was a native of Ireland, and born in 1724. He was first a linen-draper in Dublin, but about 1748 became professionally an author in London, and soon afterwards appeared unsuccessfully as an actor. A life of irregularity and debauchery introduced him to some fashionable acquaintances, whose influence procured his appointment to succeed Beau Nash as master of the ceremonies at Bath and Tunbridge. His extravagant habits remained with him there, and he died very poor, in March, 1769. His avowed literary works are of little importance. His edition of Dryden did more credit to the printer than to the editor. His translation of the third Satire of Juvenal was commended at the time it appeared.

DESIGN, SCHOOLS OF. *English Schools of Design.*—In the year 1835 a committee of the House of Commons was appointed to inquire 'into the best means of extending a knowledge of the arts and of the principles of design among the people (especially the manufacturing population) of this country; also to inquire into the constitution, management, and effects of institutions connected with the arts.' Numerous witnesses, examined before the committee, deposed to the great cost and importance of procuring designs, patterns, and models for manufactured articles, such as should win approval by their elegance and good taste; and there was a general tendency to the opinion that the French, from a better system of instruction in the arts of design, are more successful in patterns and designs generally than our own countrymen.

In the early part of the next year, 1836, another committee was appointed, by whom nearly forty witnesses were examined; and in the Report made by the committee to the House they advert with expressions of regret to the little encouragement which had been given in this country to the cultivation of taste among workmen. 'To us,' the Report states, 'a peculiarly manufacturing nation, the connexion between art and manufactures is most important; and for this merely economical reason (were there no higher motive) it equally imports us to encourage art in its loftier attributes; since it is admitted that the cultivation of the more exalted branches of design tends to advance the humblest pursuits of industry, while the connexion of art with manufacture has often developed the genius of the greatest masters in design.' (p. 3.) The general recommendations of the committee were, that there should be a 'Normal School of Design' established by the government, where both theoretical and practical instruction should be given on the application of art to manufactures; that there should be 'local' or 'branch' schools established at the chief seats of manufacture, such as Manchester, Coventry, the Potteries, Sheffield, &c.; that the government should advance part of the funds for such branch schools, the remainder being provided by those locally interested; that encouragement should in every way be afforded to the establishment of 'Museums of Art' in provincial towns, as a means of diffusing a knowledge and love of art; that easy access should be afforded to Botanical Gardens, wherever practicable, as a medium of obtaining knowledge respecting the forms and colours of flowers; and that the principles of design should form a portion of any permanent system of national education.

These recommendations embraced a wide scope; but that part of them which related to the establishment of a School of Design was at once taken up by the government. In the same year the Board of Trade recommended to the Treasury an application to parliament for a grant of 1500*l.* for the establishment of a School of Design at Somerset House. It was proposed to intrust the management of the scheme to a council of competent persons, guided by such regulations as the government should make for the proper expenditure of the public money. It was further proposed that the officers of the school should consist of a director, two masters, and one or more assistants; that the duty of the director or curator should be to select proper objects for the museum, to submit estimates of the expense to the Board of Trade, and to manage the system of instruction in the school; that the school should be open to all applicants, upon payment of a small fee; that the museum should by degrees be furnished with books, casts, specimens, drawings, and prints; and that exhibitions, premiums, and nominal rewards should be introduced, as incentives to improvement. In partial conformity with this plan, two schools, morning and evening, were opened in 1837. The fee payable was a monthly one, amounting (from the opening of the school to the end of the year 1838) to 16*s.* per month for the morning school, and 4*s.* per month to the evening school; and the number of pupils who paid these monthly rates varied from eight to twenty-five in the morning school, and from eighteen to fifty-eight in the evening school. At the commencement of the year 1839 a reduction was made in the morning school fee from 16*s.* to 4*s.*, and in the evening school fee from 4*s.* to 2*s.* Mr. Papworth was director of the school till August, 1838; after which he was succeeded by Mr. Dyce. In the spring of 1838 Mr. Dyce, who had been sent abroad by the council of the School of Design, made a Report to the Board of Trade, giving the result of certain inquiries which he had instituted on the Continent, the object of which was to determine whether foreign Schools of Design present individually a model which might be proper to follow in organizing the school at Somerset House, or collectively any common character or principle which might serve as a general guide in making out the course of instruction. Mr. Dyce visited France, Belgium, Prussia, and other countries, and gave a full account of the Schools of Design in those countries; from which he drew the inference that, though there was no one school calculated to serve as a model, there was a general spirit or character pervading the whole: this general spirit consisted in making the Schools of Design not mere drawing schools, but institutions for the study of design in connexion with mechanical art.

In February, 1841, a report made by the council of the School of Design to the Board of Trade detailed the chief results obtained from the opening of the school down to that period. At first only a morning school, from ten till four o'clock, was established; but in order to meet the object in view more fully, an evening school meeting from six to nine was afterwards established, and much more fully attended than that held in the morning. Soon after and consequent upon recommendations in this Report the Treasury arranged that the sum of 10,000*l.* should be placed at the disposal of the council, for the establishment of Branch Schools in the more important towns. Applications had been made to the Board from many of the manufacturing towns to this effect; and it was deemed desirable to aid in the object. The terms proposed were as follow: 1st. That 5000*l.* should be expended in making a collection of moulds in the various departments of art, from which casts might be furnished either gratuitously or at a very cheap rate: 2nd. That 5000*l.* should be applied in aid of the contributions of the supporters of Branch Schools of
the outfit and engagement of teachers: 3rd. That
tribution from the public grant should be proportio
amount of each provincial subscription: 4th. That
for the proper management of the schools should be a
the council to the acceptance of the grant; the due
of such conditions being secured by the occasional
of the schools by an officer appointed by the council

During the progress of the school, annual distri
prizes have taken place, consisting of sums of money
four, or five guineas each, presented either by th
or by individuals who felt an interest in the p
decorative art. At first these prizes were give
best designs in certain branches of industry dep
taste; but it was soon found that elementary skill
ing; and some of the prizes were therefore given
mens of drawing, painting, or modelling from
flowers; the others being awarded for designs for
purposes, such as wall-papers, printed cottons and si
plate, stained glass, and other articles in the decorat

The plan of instruction was modified to the
form:—It was divided into three sections; of whic
comprised drawing, modelling, and colouring, each
into many branches; the second comprised the hist
ciples, and practice of ornamental art, distinguishin
mediæval, and modern styles; while the third com
practical application of the above studies to the pro
designs for manufactures. Hitherto we believe that
been done towards an efficient mode of instruction
two latter branches.

With respect to drawings and casts, the council,
about the year 1842, put in force the following th
—1st, an elementary work on ornamental design
pared by the director, Mr. Dyce, and published
2nd, a collection of ornaments was procured from
des Beaux Arts at Paris, with a view to the pro
moulds and casts for general diffusion in this countr
purchase was made of copies of Raffaelle's Arabesq
Loggie of the Vatican, the copies being executed in
on canvas screens the same size as the originals.

Another feature was, the establishment of the
School of Design at Somerset House, in Octob
The object was, to instruct females in the arts of
manufacturing purposes; and the council in referen
remarked, that 'The fitness of such an occupation for
the various branches of ornamental manufacture f
their taste and judgment are adapted; the desirab
enlarging the field of employment for well-educated
and the successful precedent of a similar institutio
Continent, appeared to the council to furnish strong
for adopting this measure.' The room which had fo
sculpture-room of the Royal Academy at Somerset H
set apart for this school; and Mrs. M'Ian, a lad
paintings had often appeared in the public exhibit
appointed superintendent of the school.

With respect to the branch schools (of which
before been established at Spitalfields), the council
Manchester, York, Coventry, Sheffield, Nottingha
castle, Norwich, and Birmingham, as the recipien
grants; with a prospective extension to other towns
offered. In all these cases the grant consisted of
outfit, varying from 300*l.* to 500*l*; and an annual pa
three years, varying from 150*l.* to 350*l.*: the period
years being fixed upon to test the system. A furt
in the development of the system was the establis
'exhibitions.' It was speedily found that ther
deficiency of qualified teachers for the branch sch
as a means of obviating the difficulty, six exhibition
each were founded, to be given to those pupils wh
be found to advance most rapidly in their studies; s
bitions to continue for a period not exceeding thr
From among exhibitioners of this class masters were
for the branch schools at Spitalfields, Nottingham,
and York, and afterwards for other schools. It w
pally during the years 1841 and 1842 that these va
sures were established; and in the next followin
change was made in the directorship by the appoi
Mr. Wilson to that office, Mr. Dyce thereupon ass
duties of inspector of the provincial schools. And
cently, upon his resignation, Mr. Ambrose Poynter
appointed the inspector.

In the autumn of 1844 Mr. Townsend, one of the
proceeded to Paris, with a view of obtaining infor

tate of the arts of design in Paris. On his return he
:d a Report to the council, in which he entered with
ninuteness into the subject. Mr. Wilson and Mrs.
also visited Paris; the former with the view of pur-
various articles of manufacture, at the 'Exposition'
ook place at Paris last year, for the use of the pupils
rset House; and the latter for the purpose of studying
n-painting at Sèvres, with a view to the establishment
s for that purpose in the government School of Design.
port made by this lady contains much valuable in-
n as to the probability of employing females in the
branches of manufacture.

Report of the Council for the present year, just issued,
own the details to the end of April, 1845. From this it
, that the number of students on the books of the Morn-
ool, from May, 1844, to April, 1845, varied from 60 to
the Evening School, from 125 to 226; and, in the Fe-
hool, from 43 to 65. The largest number attending at
was 192, at the Evening School, in January. In almost
epartments an increase in the numbers had taken place
ared with the year 1843-4. The following table
e relative ages of the students, in the month of Fe-
1845:—

Ages.	Morning School.	Evening School.
12 to 15	31	0
15 to 20	41	115
20 to 25	21	83
25 to 30	7	17
30 to 35	4	8

mber of schools under the control of the Council, in
y, 1845, was 10, and the number of students at that
follows:—Somerset House, 396; Spitalfields, 190;
ster, 150; Birmingham, 257; Coventry, 106; Shef-
7; Nottingham, 36; York, 76; Newcastle, 140;
v, 360;—total, 1558.

rings have been obtained from Italy of arabesques,
pavements, terra-cottas, &c. M. Guizot has presented
chools casts from the celebrated gates of the Baptistery
ence. Specimens of paper-hanging, silk, glass, porce-
onze, wax ornaments, and other objects, have been
ed or presented for the use of the schools. Books
en purchased or presented, forming a library of refer-
matters relating to art and decoration; and some of
ooks are, under certain regulations, lent out to the
. Books have been sent by the Council to all the
al schools, in some cases as a gift, and in others on loan,
anferred from one school to another in succession. In
ale School, the students are in most cases preparing
or other of the following employments:—pattern-
s, designers for wood-engraving, for lithography, for
's books, for porcelain, and for ornamental articles
y; or else as teachers: and the specimens produced
comprise, among others, patterns for lace, for chintz,
-paper, for porcelain, &c. On two days in the week,
ion in wood-engraving is given to a small class. The
ffered to students at Midsummer of the present year
esigns for carpets, silk-damask hangings, table-covers,
angings, furniture and chintz, chandeliers, &c.; as also
esques, frescoes, encaustics, drawings, original models,
rom casts, drawings of flowers, &c.: most of these are
ed for in the Male Schools only, but some are open
the Female School.

ral rooms in the Strand front of Somerset House
d for the purposes of the school. The room for
ale students is on a different floor, and wholly dis-
om the others. The morning and evening students
ale schools have three rooms appropriated to them.
first, an anteroom, the walls are covered with speci-
f fresco, encaustic, distemper, oil, and other kinds of
, comprising arabesques and ornamental subjects gene-
the copies from the arabesques of the Vatican are
upon revolving quadrangular pillars, for the conveni-
the students copying them. Beyond this room is the
om where the greater part of the students assemble;
vided with long ranges of desks and seats, and con-
es for suspending the drawings or other objects which
e copied; and there are portfolios at hand for contain-
rge collection of ornamental designs and drawings.
side of the room is a bench where the studies in model-
pursued; and near it are plaster casts conveniently
for copying. Around the room, at a considerable
from the ground, is a gallery, the walls of which are
ith plaster casts, illustrating various kinds of decorative
art. Adjoining this large room is a smaller one containing casts from statues, busts, groups, friezes, bassi-rilievi, and other specimens in plaster, with conveniences for drawing and copying.

Admission to the schools is not obtained without a recommendation from respectable individuals; and the fees payable continue the same in amount as they have been for some time past; viz. 4*s.* per month in the Morning School, and 2*s.* per month in the Evening School and the Female School.

Foreign Schools of Design.—Mr. Dyce ('Parl. Pap.' 1840, vol. xxix. p. 633) states that the present system of Art-education in Prussia consists of Primary or Elementary Instruction; Secondary and Normal Instruction; and Academical Instruction, in the Schools of Fine Art; a division corresponding very closely with the system followed in Prussia for general education (for which see SCHOOLS, P. C.). In Prussia, 'under the term *Fine Art*, every species of decorative design is supposed to be included; no difference in principle being recognised between that kind of art which is applicable to manufacture, and that which has for its object the poetical, the imaginative, or the historical. The immediate result of this opinion is, that, in the matter of education, the difference between a school of design for manufacture and an academy of fine art is made to consist not in the kind of instruction afforded, but in the amount or degree to which it is carried.' The Elementary Schools, of which there is one at Berlin, one at Düsseldorf, and several others in provincial towns, give instruction in 'Drawing from the Antique,' 'Modelling from the Antique,' and 'Geometrical and Architectural Drawing.' They are open to all applicants, on payment of an average fee of about twelve shillings per annum.

The next higher grade includes two schools, the 'Gewerb Institut' and the 'Bau Akademie,' both at Berlin. In the former of these two the studies have reference to all the branches of science or art bearing upon manufactures; comprising drawing of machinery, modelling in clay, elementary geometry, architectural drawing, principles of construction, various branches of mathematics, the physical sciences generally, practical mechanics, mineralogy, original sketching, perspective, sculpture, and studying in workshops belonging to the Institut. Admission to this school is generally contingent on a favourable progress through the elementary schools; and many of the students who leave it become competent overseers and directors of large manufacturing establishments. The education is gratuitous; and rewards are occasionally given to the students. The second of these two schools, the 'Bau Akademie,' is for the education of artists in the branches of manufacture depending on architectural knowledge; architecture being here considered rather as a science than a fine art. All the matters which bear in any way on building, civil engineering, or surveying, come within the scope of this school. The highest class of schools is that which belongs to the Royal Academy of Berlin, and in which the fine arts are embraced in their widest range, without reference to any particular mode of application; all the other schools being subordinate to this as parts of the national system.

In Bavaria (Dyce, p. 645) the education in art is so peculiarly mixed up with education generally, that it is scarcely possible to separate them.

There are six different kinds of education, and four grades. The six are

1. Purely scientific education.
2. Purely popular education.
3. Agricultural combined with scientific education.
4. Agricultural combined with popular education.
5. Technical combined with scientific education.
6. Technical combined with popular education.

The four grades are—

1. Elementary.
2. Gymnasial.
3. Lyceal.
4. University.

Some of the six sections go through all the four grades of study, while others embrace only two or three. In all of the sections the study of art occupies a prominent place; but the one which approaches nearest to the Schools of Design is the Technical or Polytechnic. The earlier stages of this department are taught at the elementary schools scattered about the country; the next stage at the Gymnasia, of which there is one to each large town; and the last stage is at the Lycea, of which there are three. The Lyceum at Munich attends chiefly to architecture and the application of the fine arts to manufactures; that at Nürnberg to metal-casting and wood-carving chiefly; and that at Augsburg to textile manufactures. The regulations of all the schools, and the bearing which they have upon each other, are minutely detailed by Mr. Dyce.

In France (Dyce, p. 657) there are, intermediate between the elementary schools and the royal academies, several others which treat of art in its relation either to manufacture or to science; and which are either supported partly by the state and partly by municipalities, or are private establishments assisted by municipalities. The 'Ecole des Beaux Arts' at Paris, schools of a somewhat similar kind at Lyon, Strasbourg, Dijon, Nancy, Bordeaux, &c., the 'Ecole Royale Gratuite de Dessin,' at Paris, are the principal of these; and in most of them a very extensive system of studies is pursued, bearing in various ways on the science and the fine art of manufactures. The school of art at Lyon, in particular, is an important one in connection with the silk-manufacture carried on in that city; and every endeavour is there made to foster taste in manufactures. Dr. Bowring spoke pointedly upon this subject in his evidence before the committee in 1836; and said that the origin of all the schools of art in France, amounting to about eighty in number, is to be traced to a conviction that the application of the principles of art and science to manufacture is the best means of advancing it. Mr. Dyce illustrates the matter thus: 'At Lyon the commercial value of taste is valued so high, that when a young man displays remarkable powers, a house will admit him to a partnership, in order completely to monopolize his services. Even in general employment, a Lyonese pattern-designer in good practice realises as much as 10,000 francs per annum.' (Report, p. 35; or p. 667 of the volume before quoted.)

DESMI'DIUM. [Zoocarpes, P. C.]

DESMOPHY'LLUM, a genus of Zoophyta, fossil in the London clay of Sheppey. (*Geol. Trans.*, N. S., vol. v. t. 8, f. i.)

DETRUSION, FORCE OF. [Materials, Strength of, P. C., p. 11.]

DEVASTA'VIT. [Executor, P. C.]

DEVONIAN SYSTEM. A great portion of the Palæozoic strata of North and South Devon has been thus termed by Sedgwick and Murchison (*Geol. Trans.*), and also referred to as of coeval formation with the old red-sandstone of Herefordshire. Further investigation has shown that a portion of the strata in North Devon belongs to the Carboniferous system, and is equivalent to the lowest shales and sandstones thereof. The old red-sandstone must certainly be admitted to be coeval with some parts of the Devonian strata, which besides contain several red-sandstone members; but there is reason to think that the true place of much of the stratification of South Devon, on the ordinary geological scale, is rather about the upper part of the old red-sandstone; and this mode of viewing these rocks harmonizes with the distribution of organic remains in the Silurian, Devonian, and Carboniferous deposits.

DIA'NCHORA, a fossil genus of Conchifera, allied to Spondylus. Dianchora striata and D. lata are described by Mr. Sowerby from the chalk and greensand (*Min. Conchology of Great Britain*).

DIAPER, a kind of textile fabric, formed of either linen or cotton, or a mixture of the two, upon the face of which a figured pattern is produced by a peculiar mode of twilling, or tweeling. [Weaving, P. C., pp. 177, 178.] Diapers, which, excepting damasks, are the most ornamental kind of twilled cloths, are chiefly used for table-linen, fine towels, &c.

'The word diaper,' observes Mr. Planché, in his 'History of British Costume,' p. 100, 'is derived by some writers from "D'Ipres," i. e. "of Ypres," a town in Flanders, famous for its manufactory of rich stuffs and fine linen before the year 1200.' 'Ducange,' he adds, 'derives it from the Italian "diaspro," the jasper, which it resembles in its shifting lights; but the first is by far the most plausible conjecture; and though we read of diapers of Antioch, it is only because Ypres having given its name to its peculiar manufacture, any similar cloth received the same appellation.'

In decorative painting, and in the ornamenting of glass, the term *diapering* is sometimes applied to a small delicate pattern introduced to diminish the appearance of baldness where a considerable space is covered with one colour, and thus to relieve the eye, without forming any part of the main design. In heraldic painting, especially, it is often resorted to, particularly where the juxtaposition of considerable masses of black and white might prove unsightly; but in all such cases it should be remembered that the diapering forms no part of the heraldic bearing.

DIASTASE. [Chemistry, P. C. S.]

DIATOMA'CEÆ. [Zoocarpes, P. C.]

DIBDIN, THOMAS, one of the sons of Charl was born in 1771. After having spent some time in the north of England, he was apprenticed at sixteen to an upholsterer in London, whom he serv years. He then joined a company of strolling Essex, and for several years wandered through the that profession. In 1795 he returned to London wrote a number of very successful pieces for theatres; and in 1797 he was engaged as an actor Garden theatre, with which, as actor or author, h to be connected for fourteen years. The latter life was spent in indigence. At the time of his de engaged in compiling an edition of his father's se which he received an allowance from the Lords miralty. He died at Pentonville on the 16th of 1841, leaving children by each of two marriages Dibdin's comedies, operas, and farces are numerou fill a long paragraph with their bare names. Ma were composed for temporary purposes; and many little or no success. But there are some which, eith merits of their own or by their adaptation to parti and singers, still maintain a place on the stage. S opera of 'The Cabinet,' and the farce of 'Past Te

DI'CERAS, a fossil genus of Conchifera, allied Chama. It includes species mostly occurring in part of the oolitic strata, and (D. Lonsdalii) the lo the greensand. D'Orbigny ranks the latter specie tina.

DICHOBUNE. [Anoplotherium, P. C.]

DICHROISM, from the Greek words δὶς (d χρόα (colour), is a term applied to that property crystals by which they exhibit different colours a the position of their axes with respect to the inci of light.

Some of the phenomena relating to the differences a crystal were observed by Dr. Wollaston in tourmali other minerals, but Dr. (Sir David) Brewster was discover that they were caused by the different ab the rays of coloured light in their passage through In the undulatory theory they depend on some modi those functions of the lengths of waves, by which colour are expressed. Sir David Brewster ob when common light was transmitted through certain of beryl, the tint, a bluish-green, was the same in tion of the crystal; and the like equality of tint, wh light was transmitted in any direction, was found yellow carbonate of lime, and in many other min this was found to be not always the case; in some of tourmaline, for example, the common light along the axis of the crystal emerges of a deep red that which passes perpendicularly to the axis is gr in some specimens of sapphire the colour seen alo is a deep blue, and that which is seen perpendicula a yellow green.

A pencil of common white light being suffered prism of doubly refracting crystal, Sir David Brew that the colours of the two images, which were the the refracted rays were parallel to the axis, differe another when the rays were inclined to the axis, an the more as the inclination was greater, the differen ing greatest when the angle of inclination was a ri And Sir John Herschel has represented ('Treatise o the 'Encycl. Metrop.') the phenomena of the ordi extraordinarily refracted pencils by algebraic equat forms

$$a = x + y \sin.^2 \theta \quad , \quad a' = x' + y' \sin.^2$$

of which the terms are functions of the lengths of for the different colours: thus x, x', denote expressi tints of the ordinary and extraordinary pencils whe dent rays are parallel to the axis of the crystal; y, sions for the tints of the pencils when the incident right angles to that axis; θ denotes any inclination dent pencil to the same axis; and a, a', are the ordinary and extraordinary pencils corresponding to of θ.

Adding these equations together, there is obtain

$$a + a' = x + x' + (y + y') \sin^2 \theta.$$

Now, when $\theta = 0$, $a + a'$ becomes equal to $x +$ latter is an expression for the tint arising from th tion of the two pencils in the direction of the crystal; or it is the tint observed in the crystal wh

ansmitted in the direction of the axis: let therefore
represented by a. Again, when $\theta = 90^\circ$, $a + a'$
qual to $x + x' + y + y'$, and this is an expression
it arising from the combination of the pencils in a
perpendicular to the axis of the crystal; or it is the
ved in the crystal, in that direction: therefore let
ssion be represented by b; then we shall have $b =$
a, or $y' + y = a - b$. On substituting these
the original equation, there arises

$$a + a' = a \cos^2 \theta + b \sin^2 \theta,$$

econd member is the expression for the tint arising
union of the two refracted pencils when the incident
es any angle θ, with the axis of the crystal.

vid Brewster also found that there are several crys-
ich if a pencil of white light, polarized in any plane,
d to fall, the transmitted light will vary in colour
to the angle which the axis of the crystal makes
plane of polarization: for example, a certain specimen
hich transmitted a greenish light only when the axis
with such plane, exhibited a blue tint when the axis
ht angles to the plane; the transmitted tints gradually
rom one to the other, by the absorption of some of the
the position of the crystal was changed. On cutting
ls in the form of prisms, in order that the ordinarily
ordinarily refracted images of a circular aperture in
might be separated from one another, he found that
e of different colours; one having the tint which
produced by transmitting through the prism polar-
, in a certain position of the axis; and the other, the
h would be produced by turning the crystal at right
that position. In the 'Philosophical Transactions'
Sir David Brewster has given lists of crystals, both
d biaxal, which possess these properties; and Sir
schel has given, for the expressions of the tints of
ry and extraordinary images in every position of
l, the equations

$$+ y \sin^2 \theta) \cos^2 \phi, \quad a' = (x' + y' \sin^2 \theta) \sin^2 \phi,$$

ϕ is the angle made by the plane passing through
f the crystal and the incident pencil with the plane
ation. From this he deduces, for the tint of the
pencil, or $a + a'$, the expression

$$a \cos^2 \theta + (m \cos^2 \phi + n \sin^2 \phi) \sin^2 \theta;$$

m and n denote the tints seen when $\phi = 0$ and
respectively: and he finds that $m + n$ is equal to
hich was before represented by b.

AMNUS. [Fraxinella, P. C. S.]

Y'OCHA, a genus of fossil Infusoria, from the Po-
r of Oran.

YOPHY'LLUM, a genus of fossil plants, proposed
y and Hutton (*Fossil Flora*) to include a large speci-
crassinervium) from the new red-sandstone of Liver-
a more delicate species (D. rugosum) from the oolitic
the Yorkshire coast. The latter is regarded as a
ter writers. Its nervures are rudely reticulated.

PELLIUM, a genus of plants belonging to the na-
r Lauraceæ. It has diœcious flowers, with a deeply 6-
read-out calyx, with equal permanent segments. The
rous flowers have 3 rows of sterile stamens; the 3 outer
rfectly petaloid, the 3 next petaloideo-unguiculate,
t the point, with 4 pits below the point; the 3 inner
ed sessile truncate, with 2 pits on each side below
, and 2 glandular protuberances at the back. The
ry, and seated in the enlarged, fleshy, shrivelled
d among the enlarged, hardened, sterile stamens.
rescence consists of single few-flowered racemes.

ryophyllatum, Bois de Rose, has alternate oblong
pering to a very fine point, which is, nevertheless,
acute at the base, papery, and smooth-netted on the
le. It is a tree, and a native of the woods of Brazil
na. It is called *Licari Kanali* by the Caribs; and
icaria guianensis of Aublet. The bark gives out a
ry like cloves, and has a hot, clove-like, peppery
t is used as a medicine by the natives in the countries
grows, and posseses powerful tonic properties.
ley, *Flora Medica.*)

SINKING. In the preparation of coined money
edals, the most important feature is the engraving of
' which is to form the stamp. The piece of steel
red with the utmost care, and is brought to a soft
n about to be submitted to the hands of the engraver.
ie or stamp is for a medal such as those which are
by Mr. Pistrucci at the Mint, and of which the
great, the metal requires to be cut away to a greater depth than in the dies for coins, such as those intrusted to the hands of Mr. Wyon. By very minute touches, and by the aid of small, fine, hardened steel tools, the engraver cuts away the steel until he has produced, in cavity or 'intaglio,' an exact reverse of the design for the medal or coin. The steel, in a soft state while being engraved, requires hardening before being applied to use. The face of the die is covered with a protecting layer of pounded charcoal mixed with oil, and it is then placed face downwards in a crucible, where it is surrounded with pounded charcoal; after being heated to a 'cherry-red' temperature, it is taken out by means of tongs, and plunged into cold water, the sudden action of which renders the steel extremely hard. When further prepared, so as to be rendered more durable, it obtains the name of the *matrix*, and might be used in that state to stamp coins or medals; but as such a matrix is very costly, and might be spoiled by fracture, arrangements are made for producing multiplied copies of it. A small block of soft steel is, by immense pressure, made to receive an impress, *in relief*, from this matrix; and from this second piece, which obtains the name of the *puncheon*, after being hardened and re-touched by the graver, *dies* or duplications of the original matrix are produced, as briefly noticed in Intaglio, P. C. These dies, when intended for coinage, are intrusted to the 'Clerk of the Irons' at the Mint, whose duty it is to superintend the die-press rooms, the purchasing and forging of the steel, and the engraving and hardening of the dies: to receive and transmit all orders respecting the dies, to be present whenever the die-press is used for multiplying the dies, and to exercise general control over all matters relating to them.

In the use of dies by means of the stamping-press, the number of blows required to transfer the device to a blank piece of metal depends upon the depth of the intaglio. Professor Brande states, that in a medal executed by Mr. Wyon, for the Royal Naval College, there was a representation of the head of the king, in such bold relief as to require thirty blows of a very powerful press to complete the impression; and that it was necessary, on account of the hardening produced by the pressure, to anneal each medal after every third blow, so that every medal was placed in the furnace ten times during the process of stamping. In another instance (a large medal struck by Boulton), some of the copies are said to have received three hundred blows each, and to have required heating and annealing after each blow.

A remarkable method is sometimes adopted of producing medals from a die by means of stamping, but upon metal which is in a semi-liquid instead of a cold and solid state: the method is called *en cliché*, and has been much practised in France. The metal of which these medals are formed is one of the various kinds of 'fusible metal,' such as will melt at a low temperature. Type-metal, consisting of five parts of lead to one of antimony, will answer for the purpose, but it is deemed better when a little more lead is added to it; many different alloys of tin, lead, bismuth, and antimony, however, will suffice. The die to be employed is fixed face downwards at the lower end of a stamper, which works within a box or case to prevent the liquid metal from splashing about; at the bottom of the box is a cast-iron plate, on which is placed a small paper tray. The alloy is melted, and allowed to cool down to a pasty state; a little of it is placed in the paper tray; the box is closed on all sides, and the stamper is allowed to fall on the alloy, by which a medallion is produced from the die, rough at the edges, and with an impress only on one side. The contact of the cold die solidifies the alloy, and produces a clear and tolerably sharp impression. The medallions so produced are trimmed at the edge by a lathe, and rendered smooth at the back; sometimes two are fixed together back to back, to form a perfect medallion, and sometimes they are mounted in cases, with only one side visible; the surface being bronzed with metallic sulphates. In some instances, instead of cliché medals being produced from engraved dies, cliché moulds are produced from models made of plaster, wood, sulphur, clay, wax, or metal: thus, the Italian figure-casters often make casts from medallions and small bassi-rilievi by means of moulds which have been made *en cliché* from models.

The process of copying medals by engraving (to which an allusion only, without any description, was given in Engraving, P. C.), depends partly on the same principle as the *Silhouette* or profile machine; that is, a lever of which one end traces over the object to be copied, and the other end over the copy itself; so that the two, though differing perhaps in extent of movement, make movements of the same kind. The object in view, in medal engraving, is to produce an engraving which shall cheat the eye into a belief that the surface is raised like a medal, instead of being flat; and specimens of extraordinary success in this art have been produced within the last few years. We may suppose a medal to be laid down flat, and that placed near it is the copper plate on which the engraving is to be made. A peculiar bent lever touches them both, having a tracer-point at one end and an etching-point at the other; the tracer-point comes down vertically on the medal, whereas the etching-point comes nearly horizontally into contact with the etching-ground of the copper plate. When the tracer-point passes over a flat or level part of the medal, the etching-point marks or engraves a horizontal line on the etching-ground; but when the tracer rises over any of the relief parts of the medal, the etching-point makes a curved line, more or less convex in proportion to the boldness of relief. By passing the tracer-point over every part of the surface of the medal, in parallel lines, the etching-point is made to mark an equal number of lines on the etching-ground of the copper plate; but these latter lines, instead of being straight and parallel, have varying degrees of curvature. In passing over a sloping part of the device on the medal, the lines in the engraving become either more closely placed or more widely separated than in the former case, according to the direction taken by the sloped surface; they thus give the light-and-shade appearance of a surface in relief.

The principle here noticed was the one acted on until within the last twelve or fourteen years; since which time Mr. Bate and M. Collas have introduced several improvements, tending to remove certain distortions of form which necessarily resulted from the older method. Mr. Bate passes the tracer over the medal at an angle of 45°, instead of vertically, an angle which he shows to be better fitted to avoid distortion than any other. A few years ago there was a project before the public, to publish engravings of the large collection of medals contained in the British Museum, as a means of illustrating the history of the times when the medals and coins were struck, and to form the engravings into a work to be called 'Medallic Illustration of British History.' A committee of the House of Commons, appointed to investigate various matters relating to the British Museum, had its attention drawn to this point; and Mr. Brockeden, as an example of the rapidity with which medal-engraving could be effected by Mr. Bate's machine, mentioned the following:—'This large medal of Henry IV., about four inches in diameter, was begun last evening at four o'clock, and finished at two o'clock this morning, that is, finished in the tracing upon the etching-ground: it then went into the hands of an inferior artist, who bit the lines traced through the ground with an acid; and it is now a proof that if an artist had superintended it, it would have united all the beauties of such a work of art.'

DIEFFENBA'CHIA, a genus of plants belonging to the natural order Araceæ, to which the Caladium Seguinum, Dumb Cane, belongs. [CALADIUM, P. C. S.]

DIEPENBECK, ABRAHAM VAN, a distinguished Dutch historical painter of the Flemish school, was born at Hertogenbosch (Bois-le-Duc) about 1607. He was already a good painter on glass when he entered the school of Rubens at Antwerp, in which he was the fellow-pupil of Vandyck; and he is the scholar who is said to have been pushed against the great picture of the Taking down from the Cross, when wet, the consequent damage to which was so admirably repaired by Vandyck. Diepenbeck lived at two periods with Rubens, before and after a visit to Rome, but in the second period more in the capacity of assistant than scholar. He was one of the best of Rubens's scholars, especially in composition and in colour: in design he was never excellent; he was too hasty in his execution. He had however a great reputation at Antwerp, and in 1641 was elected director of the academy there, an office which he held until his death in 1675.

Diepenbeck came to England in the time of Charles I., and was employed by William Cavendish, duke of Newcastle, to make the pictures for his book on horsemanship, some of which in Walpole's time were still exhibited in the hall at Welbeck.

Diepenbeck's works are very numerous, but they consist chiefly of designs made for booksellers. Heineken has given a long list of the engravings after them in his Dictionary. One of his principal works is a series of fifty-nine designs, published in 1655 at Paris, under the title of 'Tableaux du Temple des Muses,' with illustrated letter-press by the Abbé Marolles: the subjects are from Ovid's 'Metamorphoses,' and
the engravings are executed by Bloemart, Matham,
eminent engravers. There are several later editio
tations of it.

His oil paintings on canvas are scarce: some pa
as the works of Rubens; but there are still many of
windows in the churches of Antwerp. Houbr
Diepenbeck was the best painter on glass of his ti

Descamps and others give 1607 as the year of Di
birth; but as he was the fellow-pupil of Van
Rubens, had earned a reputation before he entered
of Rubens, and was elected director of the Acade
werp in 1641, it is very improbable that he was b
as 1607. D'Argenville gives 1620 as the date of
but this is evidently an error. Houbraken states th
not know in what year he was born.

(Houbraken, *Groote Schouburg der Nederlands*
schilders, &c.; D'Argenville, *Abrégé de la Vie des p*
Peintres; Descamps, *Vies des Peintres Flama*
Heineken, *Dictionnaire des Artistes*, &c.; Walp
dotes of Painting, &c.)

DIES, ALBERT, a landscape-painter and engr
at Hanover in 1755. He learnt the first drudgery
under an obscure artist of Hanover, with whom he s
years: at the expiration of this period he visited
for a year, whence he went to Rome in 1775, w
ducats in his pocket, a donation from the royal trea
Rome he attracted the notice of the celebrated P
of the earl of Bristol, who wished to make a secon
Rosa of Dies, but the painter preferred sketching f
to copying or to imitating the works of the gloom
tan: his favourite retreats were about Albano and

Dies remained several years in Rome, but in
while paid a visit to Naples. He also publishe
landscape etchings in Rome, executed in company
other German artists. He returned with a Rom
Germany in 1796, and established himself at Vie
he obtained a great reputation, notwithstanding a n
bility which he had brought on by taking, whilst
some solution of sugar of lead in mistake for a
which he was using. His right side was so much a
this nervous debility, that he was forced to give u
the use of his right hand, and he painted for some
his left. He was at length forced to give up pai
gether, and his only remaining resource was poet
was a poet. He was also a musical compose
performed with skill upon several instruments. Be
ral minor pieces upon the arts, he was the author
didactic poem entitled 'Der Genius der Kunst.
few of his musical compositions have been publishe
wrote a biography of Jos. Haydn. He died at
1822, after an illness of thirteen years.

(*Archiv für Geschichte*, &c., 1825; Nagler, *Ne*
meines Künstler-Lexicon.)

DIEST is a flourishing town in the province of
bant, in the kingdom of Belgium. It is situated in a
the banks of the Demer, which traverses it in seven
51° N. lat. and 5° E. long., and has within its walls
dens. It has several churches, and a population of
bitants. There are manufactures of stockings, woo
worsted, some brandy distilleries, and numerous brew
beer of which is highly esteemed.

(Hassel, *Erdbeschreibung;* Stein, *Lexicon;* Stei
buch, by Hörschelmann; Cannabich, *Lehrbuch.*)

DIETRICH, JOHANN WILHELM ERNS
the most distinguished German painters of the
century, was born at Weimar, in 1712. His fathe
Georg Dietrich, who was his first instructor, was co
at Weimar, and painted portraits, battles, and gen
with considerable success. In his twelfth year his
him to Dresden to study under Alexander Thie
brated landscape painter, and he attended at the
the Academy of Dresden. Dietrich rapidly dis
himself; and in 1730, when only eighteen years
was presented at Dresden to August II., king o
who appointed him his court painter. He found, a
time, a generous and valuable patron in Count
whom he painted much in his house at Grochw
destroyed; the Count granted him an annual
400 dollars, or sixty pounds sterling.

In 1741 Dietrich was appointed his court
August III., king of Poland; and in 1743 he was
same king to Rome to prosecute his studies the
remained there only one year. In 1746 he re

intment in the picture gallery, with a salary of 400 dollars per annum, or about eighty guineas; and when the demy of the Arts, of Dresden, was established in 1763, trich was appointed one of the professors, with a salary of rix-dollars, and he was, at the same time, made director he school of painting in the porcelain manufactory at ssen. He died at Dresden in 1774, aged sixty-two, and pposed to have hastened his death by his incessant appli- n to his art; for, notwithstanding an extremely rapid sition he was an indefatigable painter, and laboured at his with little intermission till within the last few years of life, when his weak state of health rendered it physically ssible. Dietrich painted in various styles, and copied master with surprising exactness. He was most able, ver, as a landscape painter; but his views were ge- y arbitrary compositions, well coloured, transparent, and vely lighted. He often painted in imitation of the style celebrated master, Everdingen, Poelemburg, Berghem, de, and in all occasions the imitations were excellent. copied also, with equal facility, the style of Raphael, gio, Mieris, and Ostade. He also repeatedly imitated yle of Rembrandt, both in paintings and in etchings, lly in religious pieces, but with somewhat less licence he costume and the proportions of the human figure: r this circumstance the most experienced judges might ceived; yet all his works display something in the g peculiar to himself.

rich painted also many rustic pieces, and pieces in the nd manner of Watteau. Two collections of etchings have been published, which are very scarce, especially rst; the second, consisting of 87 plates, was published his death, retouched by and under the direction of . Some of his etchings are signed Dietrich, and others ey; the earlier ones are marked with the former name. are also many prints after his works by other masters. re are twenty-seven of Dietrich's pictures in the Royal y at Dresden, and there is a good collection of his s and sketches in the collection of prints there.

sel, *Miscellaneen Artistichen Inhalts*; Heineken, *ichten von Künstlern*, &c.; and *Dictionnaire des Ar-* &c.)

FFERENCES, EQUATIONS OF. [EQUATIONS OF ERENCES, P. C. S.]

FFERENTIAL EQUATIONS. [EQUATIONS, DIF- TIAL, P. C. S.]

GBY, GEORGE, EARL OF BRISTOL, was born 12 at Madrid, where his father John earl of Bristol en ambassador. He was educated at Magdalen College, rd, travelled in France, and in 1640 entered public life e of the knights of the shire for Dorsetshire. From time his career was marked by that uninterrupted series ever inconsistencies, which make his life like a novel and character like a riddle. Neither his character nor the ents of his history can be adequately understood, unless a full collection of particulars. Such a collection will be in the very long memoir of him given in the 'Bio- Britannica.' After distinguishing himself in the e of Commons as a member of the opposition, he sud- joined the court in the middle of Strafford's trial: after- he advised the seizure of the six members, and was one e most violent of the king's imprudent advisers. Com- d to leave England, he served in the French wars of the de, where he gained high reputation, but behaved so ngly as to be cashiered: and next, seeking service the king of Spain, he embraced the Roman Catholic , against which he had formerly written a treatise. the Restoration he returned to England, and sat in the of Lords, where he, a Roman Catholic, spoke and in favour of the Test Act. Another of his most pro- t public appearances was his impeachment of Lord ndon in 1663. This able but eccentric and useless man at Chelsea on the 20th of March, 1677. His literary cter is not more than respectable. His principal works several speeches, a good many letters, a translation of the three books of the French romance of 'Cassandra,' and a y play called 'Elvira, or the Worst not always True, a edy, written by a Person of Quality,' which was licensed printed in 1667, and is reprinted in Dodsley's 'Old s.'

IGITA'RIA, a genus of grasses belonging to the tribe ceæ. It has fingered spikes, the spikelets in two rows ne side of a flattened rachis, unarmed, 1-flowered with an rior rudiment · the glumes 2, lower very small, upper 3-nerved; the sterile flowers of one 5-7-nerved palea resembling the upper glume and equalling the flower. This genus has obtained its name from the singular form of its heads of flowers, which look like fingers. Two species are described as natives of Great Britain. *D. sanguinalis* was formerly found in Battersea Fields, near London, but is not a true native. It has the leaves and sheaths hairy, the flowers oblong-lanceolate, glabrous with downy margins. It is a common plant in Germany, and has obtained its specific name from an idle trick which the boys in some parts of Germany have of pricking one another's noses with its spikelets till they bleed. It abounds by the roadsides in Poland and Lithuania, in which countries its seeds are collected, and boiled whole like rice with milk, and is esteemed as a pleasant article of diet. The other species is *D. humifusa*; it has leaves and sheaths glabrous, flowers elliptical and downy, with glabrous nerves. This is a rare plant, and grows in sandy fields. It is a true native in many parts of England.

(Babington, *Manual*; Loudon, *Encyclopædia of Plants*.)

DILIGENCE, in the law of Scotland, is an expression nearly equivalent to execution in the law of England. It includes the various means by which the person may be seized and imprisoned, or the property attached and disposed of, to the end of enforcing payment of debt or performance of any civil obligation. It would not give a comprehensive view of the object of this procedure to say that it is for the purpose of carrying out the judgments of the courts of law, because it is a characteristic of Scottish procedure that not only will an agreement properly executed between parties to allow diligence to proceed without a judgment (as in a warrant to allow judgment to be entered up in England) be a sufficient warrant for diligence, but there are certain pecuniary obligations, of which it is the characteristic that summary or the more rapid kind of diligence can proceed on them if they are not in any way vitiated or imperfect. These documents are bills of exchange and promissory notes, and the facility of recovering the debts contained in such documents, by a rapid method of execution, is a marked feature in the mercantile code of Scotland, and one which is believed to have beneficial effects. Before diligence can issue, such a document must be protested and registered in the books of some competent court, and thence the diligence issues, as if it were founded on the decision of the court. The registers being accessible to the public on payment of certain fees, it is believed that this facility for tracing the initial steps of bankruptcy is made use of by members of the mercantile community of Scotland, who have a machinery by which they can inform each other of the persons whose names appear on the register.

Diligence is either against the person, by imprisonment, or against the estate, by attachment and sale. The latter class is divided into two kinds—that against the heritable or real estate [ADJUDICATION, P. C. S.], and that against the moveable. This latter admits of a subdivision into an attachment of property in the debtor's possession, called in the ordinary case Poinding [POINDING, P.C.S.], but where it is by a landlord for rent, Sequestration; and an Attachment, in the hands of a person who is owing money to the debtor or holds property belonging to the debtor in his custody. [ARRESTMENT, P. C. S.] Formerly diligence, in the greater number of cases, proceeded on the clumsy fiction that the debtor, being charged to pay in the king's name and refusing, was to be denounced a rebel by a messenger at arms, who certified that he performed the denunciation by three blasts of a trumpet, and it was nominally as a rebel that his person or estate was seized. A more simple and economical procedure has been substituted for this by 1 & 2 Vict. c. 114.

DILLENIUS. [SHERARD, P. C.]

DILUVIAL FORMATION. The superficial deposits of gravel, clay, and sand (sometimes containing shells and bones of land mammalia), which lie far from their original sites on hills, and in other situations to which no forces of water now in action could transport them, are thus termed. The explanations proposed by geologists are various, and as yet unsatisfactorily demonstrated. Violent floods passing over the land; streams flowing formerly at levels and in lines now impossible; the littoral action of the sea during the time of the uplifting of the land; glacier movements; and the flotation of icebergs over the surface while yet it was covered by the ocean, have all been strongly proposed for adoption: but the phenomena are very complicated, and seem to require many partial solutions, involving change of level of sea and land as the fundamental condition. For a statement of many interesting facts on this subject, see Buckland, *Reliquiæ Diluvianæ*; Agassiz, *Etudes sur les Glaciers*; Murchison, *Silurian System*; Hopkins, in *Cambridge Phil. Trans.*

DIMEROCRINI'TES, a genus of Crinoidea, proposed by Phillips (*Sil. System*, t. 17) to include species of Crinoidea inarticulata of Miller, with the finger-joints in double rows. From the Wenlock limestone.

DIODON. [GYMNODONTES, P. C. S.]

DIONY'SIUS CATO. This is the name given to the author of a Latin work in four books entitled 'Dionysii Catonis Disticha de Moribus ad Filium.' But the real name of the author is unknown, and also the time when he lived. It is admitted, however, that he lived before the time of the Emperor Valentinian. These Disticha, which are in verse, are short moral precepts intended for the edification of youth.

There was a work by M. Cato (probably the younger Cato) entitled 'Carmen de Moribus,' from which Aulus Gellius (xi. 2.) has given several extracts; but it was not a poem, as some critics have falsely concluded from the word Carmen; for that word meant something expressed concisely, and did not necessarily imply any metrical arrrangement of the words. The work of Cato seems mainly to have consisted of moral precepts, and the existence of such a work may have induced the writer or compiler of these Distichs to attach to it the name of Cato.

The style of these Distichs is simple, and the language generally pure. During the middle ages they were much used in the schools for the purposes of instruction, both on the continent of Europe and in England, and they have been used in some parts of England even to the present century.

The great number of editions shows the popularity which this little work once had. The earliest known edition is without date: a copy of it, apparently the only copy known to exist, is in the library of Earl Spencer. One of the latest and best editions is by Arntzenius, Utrecht, 8vo. 1735. There is a Greek translation of the Distichs by Maximus Planudes, which was published at Paris, 1543, 4to. Weigel. There are translations of the Distichs into many of the languages of Europe. Caxton published an English version of the Distichs, which was made from the French, 1483, folio. There are several English translations from the Latin, the latest of which perhaps is that of N. Bailey, 8vo. London, 1771.

(Bähr, *Geschichte Röm. Lit.*; Schweiger, *Handbuch der Classischen Bibliographie.*)

DIONY'SIUS OF CO'LOPHON, a celebrated Greek painter, who lived in the time of Pericles. His works were known to Aristotle, who, in speaking of imitation, says, that it must be superior, inferior, or equal to its model, which he exemplifies by the works of three painters. Polygnotus, he says, painted men better than they are, Pauson worse than they are, and Dionysius as they are. By which we may infer that Dionysius was a good portrait painter. His style was laboured, as we learn from Plutarch, who states that his works had both force and spirit, yet they appeared to be too much laboured.

Polygnotus and Dionysius were contemporaries, and, according to Aelian, painted similar subjects in a similar style, except that Dionysius painted in small, and Polygnotus in large. Aelian, in the passage alluded to, evidently refers to the styles of the two painters, and not their pictures; he says that Dionysius imitated in every respect, except in size, the art of Polygnotus. Nearly the same might be said of Garofolo with respect to his small works and the art of Raphael, without implying that Garofolo copied in small the pictures of Raphael, which is the interpretation given by Sillig and others to the words of Aelian, namely, that Dionysius copied in small the pictures of Polygnotus.

There was another painter of this name who lived in Rome about the time of the first Roman emperors. Pliny states that his works filled picture galleries; he was probably a portrait painter, and was the same Dionysius who was called, according to Pliny, the Anthropograph, because he painted nothing but men.

(Aristotle, *Poet.* c. 2; Plutarch, *Timol.* 36; Aelian, *Var. Hist.* iv. 3; Pliny, *Hist. Nat.* xxxv. 37, 40.)

DIOSCU'RIDES (Διοσκουρίδης), a very celebrated antient gem engraver who lived at Rome about the time of the Emperor Augustus. Augustus and later emperors were in the habit, according to Suetonius, of using a seal, representing Augustus's portrait, which was engraved by Dioscurides.

There are still several gems extant which bear the name of Dioscurides, but the genuineness of most of them has been questioned; a few of them however are beautifully finished, and are perhaps worthy of the reputation of the greatest gem
engraver of antiquity, a reputation which Dioscur
according to Pliny.

A Dioscorides of Samos was a worker in mosai
his works have been discovered in Pompeii.

(Suetonius, *Augustus*, 50; Pliny, *Hist. Nat.*
Bracci, *Commentaria de Antiquis Scalptoribus*, &c.
elmann, *Geschichte der Kunst des Alterthums.*)

DIOSPYROS. [EBONY, P. C.]

DIO'TIS (double-eared, from δὶς, double, and
ear), a genus of plants belonging to the natural
positæ, the tribe Senecionidæ, and the section An
It has homogamous discoïdal heads; florets herm
tubular, the tube compressed, with two auricles at
the receptacle convex with concave downy-topp
the involucre bell-shaped, imbricated; the fruit co
crowned with the persistent auricled tube of the co
maritima is the only British species. The whol
densely cottony and white; the stem is about a foot
cumbent below, densely leafy and corymbose ab
leaves sessile, oblong, obtuse, flat, crenate, persis
heads in terminal corymbose tufts; the flowers a
It is found on sandy sea-shores, but is a rare plant.
adopted by some botanists as the name of a genus
belonging to the Chenopodiaceæ, the *Axyris ce*
Linnæus. It is a shrub of no great beauty, and is
in Siberia, and some parts of Austria. It thrives
light soil, and is easily increased by layers or cuttin
hand-glass.

(Babington, *Manual*; Koch, *Flora Germanica.*)

DIPLACA'NTHUS, a genus of fossil Placoid f
the old red-sandstone of Scotland. Agassiz admits fo
(*Reports of British Association for* 1842.)

DIPLEU'RA, a genus of Trilobites, proposed b

DIPLOCTE'NIUM, a fossil genus of lamellifer
allied to Turbinolia, from Maastricht.

DI'PLODUS, a genus of fossil Placoid fishes, fro
formation and mountain limestone. (Agassiz.)

DIPLO'PTERUS, a genus of fossil Placoid fishe
old red-sandstone of Scotland, three species; an
shale of Leeds, one species. (Agassiz, in *Report*
Association, 1842.)

DIPLOTAXIS (from διπλοῦς, double, and
arrangement, on account of the double rows of se
cell), a genus of plants belonging to the natural o
feræ, and the tribe Brassiceæ. It has a compresse
subconvex valves with one straight nerve, and the
or oblong, in two rows. The species are herbace
natives of Europe and the temperate parts of Asia
There are two British species: *D. tenuifolia*, wi
branched glabrous stem, shrubby below; and *D.*
an herbaceous simple hispid stem. The former
plant with large yellow flowers, and grows on old
is not an uncommon plant in England and Sco
latter is a rare plant.

(Babington, *Manual*; Loudon, *Encyclopædia.*)

DIPŒNUS AND SCYLLIS. [SCULPTURE, P.C

DIPSACUS. [DIPSACEÆ, P. C.; TEAZLE, P.

DI'PTERUS, a genus of fossil fishes, from th
sandstone of Caithness and Herefordshire. (Valenc
Pentland, *Geol. Trans.*, 2nd series, vol. iii.)

DIRCA, a genus of plants belonging to the na
Thymeleaceæ. It has a campanulate calyx, with a
unequal limb; 8 capillary projecting filaments in
the middle of the tube, alternately longer; the styl
at the apex. This is an American genus, with a sin
the *D. palustris*. It is remarkable for growing
places, and is called *Bois de Plomb* by the Fren
found in the low woods of North America, bearing t
cold and the greatest heat of the various parts of
States. It is an irregular shrub, with a tendency to a
direction in its branches. The flowers are yellow,
before the leaves, and when young they are enclose
small hairy bud, occupying a sheath or cavity in
each flowering branch. The fruit is a small, oval,
1-seeded berry. This plant is in all its parts very
the twigs are used for making rods, the bark for rop
&c. The bark is acrid, and in doses of 6 or 8 gr
duces heat in the stomach, and brings on vomitin
acts as a vesicatory when applied to the skin, an
doses as a cathartic. The fruit possesses narcotic
and produces effects upon the system similar to tho
monium. Snails are observed to be very fond of
when it is cultivated. In its cultivation, layers requir

ce they produce roots. It cannot be propagated in this
ntry either by cuttings or seeds.
Loudon, *Encyclopædia*; Lindley, *Flora Medica*.)

ISA'STER, a subdivision of Echinodermata, including
tangus ovalis of Phillips. From the oolite. (Agassiz.)

ISCO'BOLI, the third family of the Malacoptery-
osseous fishes in the arrangement of Cuvier. The dis-
ishing character is the presence, on the under surface of
body, of a disk composed of the united ventral fins. The
of this family are popularly known as sucking-fishes.
most common and most remarkable species inhabiting the
h seas is the Lump-sucker, *Cyclopterus Lumpus*. It is
ge-bodied small-finned fish, bearing on its back an ele-
crest or ridge, and having a powerful sucker under its
formed of the combined pectorals and ventrals. Before
awning season it is of a brilliant crimson colour mingled
orange, purple, and blue, but afterwards changes to a
lue or lead colour. When full grown it is rough with
cles, but when very young is smooth and beautiful,
d with brilliant stripes of various hues. In the seas of
rkneys, in June, numbers of the young fish, half an inch
gth, are seen swimming around floating seaweeds. For
time they were supposed to belong not only to a dif-
species, but even to a different genus. In the old fish
cker is so powerful that a pail of water, containing some
s, has been lifted up by a person holding the tail of a
pterus adhering to the bottom. It lives on young fish.
brought to market, but oftener as a curiosity than as an
e of food. The *Cyclopterus Lumpus* ranges from the
of Greenland to those of the south of England, and west-
as far as the coast of North America. Another genus
s family is *Lepadogaster*, consisting of a number of small
which have two disks on the under surface of their
s, the one formed by the pectoral fins and the other by
entrals. They adhere to stones, rocks, and shells by
disks. They have wedge-shaped defenceless bodies,
th and without scales, often painted with the most bril-
and defined colours. The Sea-snail, or *Liparis*, is a third
of this family, the species of which resemble gobies in
. They are found under stones at low-water mark, and
not so brilliantly coloured as others of the tribe. They
furnished with a single sucker formed by the united ven-
and pectorals.

ISCOI'DEA, a genus of Echinodermata, in which are
ed, by Gray and Agassiz, several species generally
ed to in works on organic remains under the title of
ites. They belong to the chalk, greensand, and oolite.

ISCOVERY. [Invention and Discovery, P. C. S.]

SPART. This word is defined under Dispart, P. C.,
is intended here merely to observe that the Dispart
ds, at the base of the gun, an angle equal to that which,
rtical plane passing through the axis of the bore, would
tained between that axis and a line (called the *line of*
drawn from the circumference of the base to that of the
e. In a 24-pounder gun, nine feet long, for example,
spart is equal to 2·735 inches, and the angle subtended
is equal to 27′ nearly; allowance must consequently be
for this value in pointing the gun by the line of metal.
order to place the axis of the bore at any angle with a
ntal plane, a 'tangent scale' is employed [Ordnance,
]; and in determining the graduations of this scale, it
nifest that the length of the part raised out of the
e in the base of the gun should (the length of the gun
considered as the radius) be equal to the tangent
e difference between the number of degrees in the
sed angle of elevation and the angle subtended by
spart; in order that, on lowering the base of the gun
line joining the top of the scale and the top of the
le is parallel to the horizon (which may be determined
spirit-level on a rod laid from one of those points to the
), the axis of the bore may be correctly elevated. Thus,
e gun above mentioned, for an elevation of one degree,
scale being raised up till the division marked 1° coincides
the top of the base ring, the part raised should be equal
e tangent of 33′ only; for an elevation of two degrees,
part raised should be equal to the tangent of 1° 33′; and
n.

ISPOSITION, in the law of Scotland, is the name given
ny unilateral writing, or, as it might be termed in England,
d poll, by which a party solemnly makes over to another
ce of property heritable (viz. real) or moveable. It is
seldom used as a title to moveables alone, and it is in the
of real property that it is of most frequent use and of highest importance. When a new feu or fief is created, it is by charter, but when a fief is transferred from one holder to another it is by Disposition, and notwithstanding the system of subinfeudation in Scotland, the latter is by far the more ordinary transaction. In the disposition, the character of the tenure, and all the conditions on which the property is to change hands, are set forth, and being given to the disponee, it is in his hands a personal obligation by the disponer to give him a full title, and contains the warrants for getting the title made real by infeftment and registration, and by obtaining the superior's sanction to the new investiture. The disposition is not only used for the absolute transference of heritable property, but also for the creation of real securities. The ordinary heritable bond was found insufficient to give the security-holder a prompt and effectual means of realising his debt by taking possession of the subject of the security, and thus there was added to it a disposition or conveyance of the subject, under reversion to the debtor, or with a right of remainder to him on his paying the debt. As heritable property cannot be bequeathed by testament in Scotland [Will, P. C.], the usual form of family settlements in which such property is disposed of is the disposition.

DISSEN, GEORG LUDOLF, an eminent German scholar, was born on the 17th of December, 1784, at Grossen-Schneen, near Göttingen, where his father was pastor. He lost both his parents at the age of thirteen, and Dissen, with his two brothers, was left almost without the means of subsistence; but a benevolent friend procured for him admission, free of expense, to the celebrated school at Pforta in Saxony, whither the boy was sent in his fourteenth year. He there laid an excellent foundation for his future philological studies; and, notwithstanding his delicate and weakly appearance, he enjoyed excellent health, and displayed the greatest activity. In 1804 he left Pforta and went to the university of Göttingen, where until the year 1808 he devoted himself to the study of philology and philosophy under Heyne and Herbart. His former friend continued to support him in the university; but he was obliged to increase his means by private tuition and reading with such students as had come to the university without being sufficiently prepared. The study of art and poetry, and of the beautiful in general, was his delight, and gave to his mind that tone and tendency which we can trace in all his literary productions. Towards the end of his academical course, in 1808, he spent some time at Dresden with his friends and pupils, and the famous picture gallery of that place made an impression on his mind which was never effaced. On his return to Göttingen he obtained the degree of Doctor in Philosophy, together with permission to deliver lectures in the university. On that occasion he published his first work, a dissertation—'De Temporibus et Modis Verbi Graeci,' Göttingen, 1809, 4to. The principal subjects with which he now occupied himself, and on which he lectured, were Greek grammar and Greek philosophy, especially Plato, the study of whose writings brought about an intimate friendship between him and Boeckh, who then used to visit Göttingen very often. His natural tendency to assemble around him young men of talent and congenial pursuits induced him, towards the end of 1811, to form a Philological Society at Göttingen, of which he was elected president. In 1812 he accepted the offer of an extraordinary professorship of Classical Philology in the University of Marburg. He entered upon his new office with an inaugural dissertation—'De Philosophia Morali in Xenophontis de Socrate Commentariis tradita,' Marburg, 1812. Philological studies were at that time rather neglected at Marburg, but Dissen gave a fresh impulse to them, although he did not remain there more than eighteen months; for in the autumn of 1813 he accepted an invitation as extraordinary professor of Classical Literature in the University of Göttingen, which was always his favourite place, and where in 1817 he was appointed ordinary professor. In his new position he acted in perfect harmony with his philological colleagues Mitscherlich and Wunderlich; and on the death of the latter, in 1816, when F. G. Welcker was appointed his successor, Dissen formed a most intimate friendship with him, which was not disturbed by the removal of Welcker to Bonn in 1819, and lasted till Dissen's death. K. O. Müller, who succeeded Welcker, became equally attached to Dissen. Incessant study and a secluded life had already impaired the health of Dissen, but his activity as a lecturer was still very great. His lecture-room was always filled, and he succeeded in inspiring his audience with an ardent love of the study of antiquity. The zeal with which he devoted himself to his professional duties and the cultivation of his own mind prevented his doing much as an author; and all that was published by him during the period from 1815 to 1825 consists of the part he took in Boeckh's great edition of Pindar, and some reviews which he wrote for the 'Göttinger Gelehrten Anzeigen.' In regard to antient writers, and poets in particular, Dissen directed his attention more particularly to analyzing the connection of the ideas, a point which had been much neglected by previous commentators. With a view to supply this want he prepared a new edition of Pindar, which appeared in 1830, in 2 vols. 8vo.; and of which a second edition, with some improvements, was published by Schneidewin in 1843. In this work Dissen propounded his aesthetical views respecting the artistic construction of the Pindaric odes. The manner in which he has executed his task clearly shows that Dissen was not only no poet, but that he had little conception of the manner in which a poet sets to work. He displays great analytical powers, but they would have been more properly applied to the works of a philosopher than to those of a poet. But his edition of Pindar is nevertheless one of the best that we have.

Dissen's illners was of an asthmatic nature, and about this time had become so much worse, that he was obliged to give up lecturing; but in proportion as his professional occupations decreased, his literary activity increased. Thus he produced in 1835 an edition of Tibullus, with valuable dissertations and a commentary, and in 1837 an edition of Demosthenes's oration 'De Corona.' The great object of these two publications is the same as that of his Pindar, to establish a mode of interpreting the antients which should not merely explain the language and subject matter of a writer, but the artistic construction of his work, and should thus, as it were, trace the secret processes in the author's own mind. This mode of treating an antient author may be very interesting and instructive, but it opens a wide field of speculation, and the results are seldom satisfactory. Immediately after the appearance of his Pindar, Dissen was severely criticised, and among others by his friend Boeckh, which greatly irritated him. His edition of Tibullus is perhaps his best and most satisfactory production; it should not be used without Dissen's 'Supplementum editionis Albii Tibulli Heynio-Wunderlichianae,' which he published in 1819. His edition of the oration of Demosthenes contains many valuable remarks on the style and peculiarities of that orator: it was his last production, and appeared only a few days before his death, which took place about the middle of September, 1837. The last few years of his life were a slow process of dying: he died almost imperceptibly, as if he had gone to sleep.

Dissen was never married; but he supported with paternal care several young men of talent whose fathers had been his friends during their lifetime. He was a man of great sensibility, enthusiastic for everything great and noble, and capable of the most devoted friendship, though in his social intercourse he seldom conversed on any other topics than those relating to the study of antiquity, for his whole mental faculties were absorbed in his pursuits. Besides the works already mentioned, we must not leave unnoticed an excellent little treatise entitled 'Anleitung für Erzieher, die Odyssee mit Knaben zu lesen,' with a preface by the philosopher Herbart, Göttingen, 1809, 8vo. A number of smaller dissertations in Latin and German, together with a selection of the reviews written by Dissen, was published as a collection after his death by his friend K. O. Müller, under the title of 'Kleine Lateinische und Deutsche Schriften, von Ludolf Dissen,' Göttingen, 1839, 8vo. It is preceded by biographical notices written by his friends Fr. Thiersch, F. G. Welcker, and K. O. Müller, from which the above notice is derived.

DISTRIBUTION OF ELECTRICITY. By this is signified the densities of the electric fluid in different bodies placed so as to act electrically upon one another, or in different parts of the same body when the latter has been subject to the electrical influence of another body.

When a body possesses equal quantities of the opposite kinds of electricity, the fluid may be conceived to be uniformly diffused through it; and two such bodies being placed in contact, will produce no effect on each other, because the attractions existing between the particles of the unlike fluids are counteracted by the equal repulsions between the particles of the like fluids. But if a body acquire by any means an excess of either the positive or negative fluid, a mutual action will take place between this body and any other in its vicinity, the fluids in the latter being previously in equilibrio or not.

It was early found that two electrified spheres, equal in magnitude, but of which one was solid and the oth
shell, acquired precisely equal quantities of the ele
and hence it was inferred that such acquired fluid e
upon or near the surface of an electrified body. T
ments also of Franklin on a charged Leyden jar wi
and exterior coatings, which could be removed a
at pleasure; and those of Coulomb, in which, by
apparatus, electricity was drawn from the surface of
body when none could be obtained from the bottom
of holes sunk in it to certain depths, sufficiently
the electric fluid exists in a stratum on the surfac
within the body at an infinitely small distance
surface.

If a sphere have uniformly diffused over its surfa
of either kind of electricity, and there be placed
with it a sphere of equal magnitude in which th
fluids are in equilibrio, a mutual action between t
will take place; the effect of which will be that the
ticles of opposite kinds in both spheres will have th
brium disturbed, and equal quantities of both kinds
to the surface of each: the density of the fluid or
ness of the stratum at either surface being differe
circumferences of circles at different distances from
of contact.

The investigation, by mathematical analysis, of th
the distribution of electricity being too extensive for
it must suffice to state the results of some of the e
made by Coulomb on that subject.

When a sphere, charged as above supposed, is
contact with another in which the fluids are in
whatever be the ratio between the diameters of th
the density or the thickness of the stratum of flu
is, at the point of contact, equal to zero; and, at th
extremity of the diameter passing through that
density is the greatest. Representing the density o
the point of contact by unity, the results of the e
with two equal spheres show that, in an indefinite
zone at thirty degrees from the point of contact on
density may be represented by 0·2; at sixty deg
that point, by 0·76; and at ninety degrees, by 0
found also that the mean density on each sphere is r
by 0·79.

When two spheres, in the circumstances just
but having the diameter of one double the diame
other, are placed in contact, the experiments of
show that, on the smaller sphere, the density oppos
point of contact is, to the density at ninety degrees
point, as 1 to 0·75; and at sixty degrees, as 1 to 0
also show that, at ninety degrees from the point o
the density on the smaller sphere is to the densi
larger as 1 to 0·8; and that the greatest densi
smaller sphere is to the mean density on the great
0·64. When the diameters of the spheres were to o
as 4 to 1, it was found that the greatest density on t
sphere was to the mean density on the greater as 1

If two spheres which have been placed in contac
sequently removed beyond each other's influence, t
of the fluid at the surface of each becomes unifor
the larger sphere the density is always greater th
smaller sphere. From Coulomb's experiments it
that when the diameters of the spheres are as 2
densities are as 1·08 to 1; and when the radii are
the densities are as 1·3 to 1. That philosopher i
from his experiments, that in no case can the ratio o
sities on two unequal spheres be greater than that o

When an electrified globe and a circular disk w
in contact, Coulomb found that the quantities of flui
were directly proportional to their entire surfaces.
tribution of electricity on the surface of a spheriod
under ELECTRICITY, P. C., p. 336.

(See Biot's *Traité de Physique*, and ATTRACTI
TRICAL, P. C. S.)

DITHYROCA'RIS, a fossil genus of Crust
named by Dr. Scouler. It occurs in Tyrone and D
Colei and D. orbicularis are described in Portlock's
Report on those counties.

DIVIDED EYE-GLASS MICROMETER.
strument of this kind, which was invented by Mr.
and by him called a Dioptric micrometer, is descri
'Philosophical Transactions' for 1779. It consisted o
lens bisected in the direction of a diameter, and pla
eye-piece of an achromatic telescope, between the
fourth lenses, reckoning from the end to which

ied. The half lenses were fixed in separate portions of a e, and, on turning a screw, they could be moved in con- y directions on the plane of section, thus causing a separa- of the two images of an object: one of the portions of ame carried two indices with verniers, and the extent of movement could be read on a scale of equal divisions gra- ed on the other portion: thus any small angle, such as which might be subtended by the diameter of a planet, , by placing the images of the disk in contact with each r, be measured on opposite sides of the zero of the scale. whole apparatus had a movement about the axis of the scope; and thus it might be used as a position micrometer. is uncertain whether or not Ramsden executed such an ument, but one exactly similar to it was made by Mr. lond.

n improved micrometer of a like kind is made by Mr. , who divides the third eye-glass of a telescope into segments, and causes them to move on the plane of by means of a screw consisting of two parts, one of h being hollow, and having both exterior and interior ds, the other part turns within it: thus the half lenses by equal quantities in opposite directions at the same The stem of the screw carries a graduated circle, on , by an index, the movement of the two images of the t is measured.

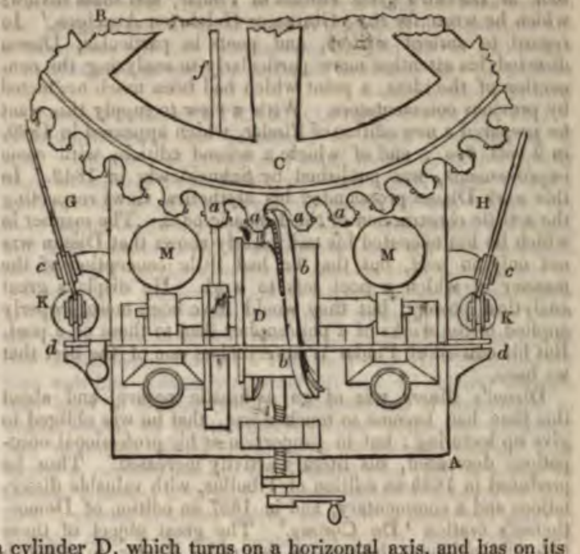
instrument, which may be considered as a divided eye- micrometer, and which is usually called a 'dynameter,' onstructed by Ramsden for the purpose of determining agnifying power of a telescope by measuring the dia- r of the pencil of light at the eye-glass, in order to com- it with the diameter of the object glass. The instrument, h has subsequently been improved by Mr. Dollond, may ed also as a micrometer for measuring any small angular nces. The divided lens is that which is nearest to the and the semi-lenses may have equal quantities of motion atrary directions communicated to them by means of a le screw on the same stem; the threads on one part of screw have their distances from one another double the nce of the threads on the other part. On the screw is a uated circle, by which, on bringing in contact the two es of the pencil of light, the diameter of the latter is sured. (Pearson's *Practical Astronomy*, vol. ii. sec. 11 33.)

r. Airy, the astronomer royal, has very recently commu- ted to the Astronomical Society a paper containing inves- tions of the distances and focal lengths of the eye-lenses telescope under the condition that (the third lens from eye being that which is divided) the prismatic dispersion ght arising from the pencil falling on the segments at where their surfaces are inclined to the optical axis may rrected at the same time that the ordinary achromatism btained. This discovery will greatly improve that es of micrometer, particularly since the focal length of urth glass, or that which is nearest to the eye, is arbi- ; and consequently the magnifying power of the tele- e may be varied by merely changing that eye-glass, the omatism remaining undisturbed.

IVIDING ENGINE. Under the word GRADUATION, ., is a brief notice of the machine constructed by Rams- or the purpose of graduating sextants and circles for nau- or astronomical purposes; and it is intended here merely scribe the principal improvement which has since been in that kind of machine.

Ramsden's engine the circle carrying the instrument to aduated was made to turn round by means of a perpetual , the teeth of which worked in corresponding notches cut e edge of the circle: the screw was caused to turn on its by a cat-gut band passing several times round a cylinder e same axis, and made fast below to a treadle which was ed down by the foot, and allowed to rise, when the foot removed, by the unbending of a spring connected with the der. In the machine now to be described, which was invention of Mr. Alexander Ross, and of which an account iven in the 'Transactions of the Society of Arts,' for 1, the circle has a more steady motion, and it possesses means of being adjusted, so that the inequalities produced he wear of the parts may be obviated.

rectangular cast iron frame, of which AB is a part, ies the circle C, which turns on a vertical axis at its tre; this axis is in the form of two frustums of cones, and lower extremity rests in a cup which is at one end of a er; at the other end is applied a counterpoise which, causing ressure upwards on the axis, diminishes the pressure of the circle on the frame which supports it. Round the circumference of the circle are forty-eight projections *a*, *a*, *a*, &c.; and at one end A of the rectangular frame, a sliding apparatus carries a cylinder D, which turns on a horizontal axis, and has on its convex surface a spiral projection *bb* like a rectangular thread of a screw; this enters between the projections *a*, *a*, &c., and the distance between the two turns of the spiral is rather greater than the breadth of one of those projections.



On the rim of the circle C, and under the projections *a a*, &c., is a groove in which enters an endless cat-gut band GH; on each side of the frame, at the end A of the latter, this band passes over a fixed pulley *c* and under a moveable pulley from which is suspended a weight K: it then passes through a notch at *d*, and above the frame, in the direction *dd*.

Four pillars, of which MM are two, rising from the rectangular frame AB, support a stage which carries the tool for cutting the divisions on the instrument to be graduated: the apparatus by which the cutting-tool is connected with the stage is formed with joints so as to allow the tool to be moved up or down, or in the direction of a radius of the circle C, but neither to the right nor left of that radius; and there is a contrivance for determining the length of the lines of division.

By moving one end of a lever at the opposite extremity of the frame AB, a bar, ff', which is attached at one end to that lever, gives motion to a catch, or click, so as to cause a ratchet-wheel to turn on its axis, and thus give the requisite movement to the cutting tool: the other extremity, f', of the bar, by turning a lever on a horizontal axle containing within it the axle of the cylinder D, allows a catch, or click, to turn a ratchet-wheel on the latter axle, and, with it, the cylinder itself; and thus a side of the spiral projection *b b* is removed a little way from its position when in contact with one side of a projection *a*. Moving then the first-mentioned lever back again, a spring, which had previously pressed against the cat-gut band on the circumference of C, is drawn off; and thus one of the weights, K, by drawing down the band and pulley above it, gives a small movement to the circle C, and consequently brings the side of a projection *a* again in contact with the side of the spiral. According to the place at which the bar ff' is applied to the lever on the axle of D, the catch may pass over any required number of the teeth of the ratchet-wheel; and thus the circle C may be turned through any angle consistently with the values of the divisions intended to be cut.

Through each of the projections *a*, *a*, &c., passes a steel screw, whose ends appear in the above cut; and through the spiral thread *b b* pass a number of steel screws, whose ends also appear. The right hand extremity (in the diagram) of each of the former screws is ground quite flat and perpendicular to the length of the screw; while the left hand extremities of the screws in *b b* are turned in the form of hemispheres; and, after every movement of the circle C and of the spiral *b b*, the machine is held in a state of rest by the abutment of the hemispherical end of one screw against the flat end of the other.

The original divisions on the circle C are made on silver studs let into its surface; and the screws passing through *a*, *a*, &c., are so adjusted, by means of their capstan heads, that if the end of a screw in *b b* is in contact with the screw in any one of the projections *a*, one complete revolution of the spiral *bb* may bring the end of the screw in the next projection *a* in contact with the same screw in the spiral. The corresponding movement in the circle is equivalent to the interval between two of the original graduations; and the movement is verified by the primitive divisions coming successively to a wire in a microscope.

DIVISION OF EMPLOYMENTS, in political economy, is an important agent in increasing the productiveness of labour. It is by labour alone that wealth is produced. It is a law of man's nature that 'by the sweat of his face he shall eat bread;' and in return for his labour he acquires various sources of enjoyment. The ingenuity with which he has been endowed, and the hard necessities of his condition, lead him to discover the most effective means of applying his labour to whatever objects he may be seeking to attain. He desires, first, to work no more than is necessary, and, secondly, to obtain the largest return—the most abundant enjoyment, for his industry. He soon finds that his own unaided labour will scarcely provide for him the barest necessaries, and that ease or enjoyment is unattainable. Thus, instead of each man labouring separately, and independently of all others, many men combine together for securing the various objects of life, by means of their joint labour; and this combination of labour leads to division of employments. Labour is naturally exerted in these two forms in the very earliest stages of society. The first pair whom God's ordinances and their own instinct united, must have combined for the support of themselves and their common family, and diversity of sex alone must have produced distinct employments. Among savages the man engages in the chace, for which he has a natural predilection, and for which his strength adapts him, while his mate rears their children and executes those functions which are suited to her sex, but which are as conducive to the comfort of both as if both performed them. In this manner a division of employments naturally arises, and each family affords an example of its origin and character.

This combination for a common object, succeeded by a division of employments, pervades every process of human industry, and increases in variety and complexity with the growth of civilization. One of the earliest forms of industry is that of fishing, and none, perhaps, exemplifies more aptly the mode in which labour is necessarily applied to the purposes of life. A man desirous of building a fishing-boat may cut down a tree, without any assistance from others, and may even hew it into shape; but if it be larger than a mere canoe he cannot, by his own strength, remove it from the spot on which the tree had fallen, and launch it upon the sea. To effect this, others must combine their strength with his. To manage a boat the labour of more than one man is ordinarily required, and the larger the boat the greater must be the number who combine to navigate it. If they paddle or row it, their labour is simply combined for one purpose and in one manner, except that one, instead of rowing, may probably steer the boat. As the art of navigation improves and its objects become multiplied, in addition to a more extensive combination of men in pursuit of the same objects, a diversity of employments ensues. In a deep-sea fishery, some attend to the nets, others to the sails; and on their return to land, some arrange the nets to dry and repair them, while others are engaged in disposing of the fish.

From these illustrations it is evident that the cause of a division of employments is to be sought in the nature and circumstances of man. It is not the result of extraordinary foresight, but is suggested by the most common exigencies of life: its convenience is obvious, but the feeling which prompts men to adopt it is spontaneous and as it were intuitive. It is a social necessity, and the very foundation of any social system whatever, yet it is practised almost unconsciously by the greater part of mankind. Its existence, however, lies so open to observation that it is scarcely to be ranked as a discovery of political economy; but that science, having noted the facts of a combination of labour and a division of employments, explains their uses and results; and in pursuing these inquiries it develops some of the most important principles connected with the production and distribution of wealth. To these inquiries we must now devote our attention.

As labour is the lot of man, it is desirable that his labour should be as productive as possible, in order that the sum of his enjoyments should exceed that of his endurance. This result is attained by several men combining their labour for one object, and pursuing different employments for their reciprocal benefit, instead of each man labouring independe for himself and employing himself in the same manner a other men. A division of employments, therefore, is not a natural incident of labour, but is an important auxiliary human enjoyment. The means by which it adds to the eff of labour are described by Adam Smith to be—1st, 'increase of dexterity in every particular workman;' 2 'the saving of the time which is commonly lost in pa from one species of work to another;' and, 3rdly, 'the in tion of a great number of machines which facilitate and abri labour, and enable one man to do the work of many:' which may be added, 4thly, the separation which it m between labour and the direction of labour; 5thly, the p which it gives of using machinery effectually, when invented, 6thly, the opportunities of exchange which it affords, and means of availing ourselves of the enjoyments arising from natural capabilities of the soil, climate, situation, or productions of different parts of the world, and of the pe liar aptitude of their inhabitants for various kinds of industry.

1. The superior dexterity of workmen engaged exclu in one occupation is universally known. 'Use is se nature,' and when a man has been long accustomed to a particular employment, not only has he acquired great dexte but his mind appears to be endowed with faculties spe adapted to his business. The jockey seems to have been b for the saddle; the sailor for the ship: both are active, int ligent, dexterous; but fancy their occupations exchanged combined! the sailor in the saddle, the jockey at the h or both alternately riding the favourite horse at New and furling the top-gallants of a three-decker at Sp The constant exercise of the faculties in any art or bu gives them an aptitude for it, which to others is a ma astonishment. The eye and the hand perform their with such precision and rapidity, that their work seems taneous, as it were, and independent of the will of the man. Without deliberation, almost without care, the la is done; and done better than others could do it with greatest pains. All processes of art and manufacture, and daily experience of all men, confirm this statement as an questionable fact. (Babbage, *Economy of Machinery* *Manufactures.*) The advantages of peculiar skill are men can work better and faster, that the products of th labour are more valuable and more abundant, and that th contributions to the general stock of the world's enjoym are multiplied. By following out these advantages th all their relations, they will be found to be the primary of wealth; and, in a moral point of view, the main c social progress and of the development of the highest fa of man.

2. 'The saving of time which is commonly lost in p from one species of work to another' enables a man wh constantly engaged in one process to perform more work he would have been able to get through in the course of day, if he had been required to change his employment. this reason, as well as on account of his skill, a division of ployments makes his labour more productive.

3. The invention of tools and machinery is the most tive auxiliary of labour, and it is necessarily promoted by division of employments. Those who are constantly atten to one business or description of labour must become be quainted with its requirements—their observation and rience are concentrated upon it—their interest urges them facilitate their own exertions. How many inventions due to workmen employed in manual labour the history the steam-engine and of the cotton manufacture will fu examples: but it is not in the case of workmen alone th division of employments facilitates invention. Their ployers also have their whole minds bent upon impro their business; and amidst the multiplication of trades a engineers and machinists, whose sole business it is to c struct, improve, and invent machinery, aided by all the li of theoretical science. And this leads us to the fourth a tage of a division of employments.

4. If all men were doing the same thing, and working themselves unaided by others, their condition would never improved; but by following particular occupations those exert most skill and industry produce more than they req for their own subsistence, and reserve a fund for the emplo ment of others. [CAPITAL, P. C. S.] And thus there gr up from the midst of the people a class of employers who dir the labour of others. Until labour is so directed and maintain by the previous accumulation of capital, it is comparativ ineffectual; and while a division of employments is a pow

ent in producing capital, the latter, in its turn, facilitates her subdivision. Without it, indeed, a system of divi- an only be carried out imperfectly and to a very small t. The growth of capital also gives to many men the us privilege of leisure, exempts them from the necessity our, and leaves them free to study, to reflect, to observe, ason and investigate. From this class arise men of e and of letters—philosophers, statesmen, historians, And even with these the apportionment of a peculiar ce gives power to their minds, and expands their know- . Their natural talents are developed, and their aptitude rticular pursuits becomes as conspicuous in intellectual try as that of other men in manual operations.

Adam Smith speaks of the importance of a division of oyments as leading to the invention of machinery, but s over its utility in using machinery effectually, when ted. Every part of a large machine requires workmen e sole business it is to work in unison with its peculiar ement. So distinct are these various processes—so di- their character—that in all large manufactures there is tensive vocabulary of names by which operatives work- n the very same factory are distinguished.* Without a subdivision of peculiar employments the most ingenious inery would be useless: and thus while machinery mul- s distinct operations of labour, these are, in their turn, tial to its efficacy.

Adam Smith assigns the origin of a division of employ- s to the 'trucking disposition' of mankind—to their 'pro- ity to truck, barter, and exchange one thing for another' . c. ii.). This love of barter however is only a secondary : men have no natural taste for it; but use it as a means btaining the various objects which they desire. If they l obtain them without the trouble of barter, they would estionably not follow barter as an amusement, any more they would work if they could get what they wanted out labour. So far, then, from the trucking disposition en being the cause of a division of employments, it would ar that a division of employments is rather the proximate e of commerce. For if all men worked in the same man- nd produced the same things, there would be nothing to hange: but as soon as men learn to devote themselves to production of one commodity, the whole of which they not consume, they must exchange the produce of their ur with others, who have been producing objects which desire to possess. This is an intelligible origin of barter commerce—consistent with the natural propensities of kind, and not requiring for its support the strained hypo- is that men have an innate disposition to truck. But a ion of employments, like barter, is itself but a secondary e; and both alike must ultimately be referred to the one al cause of all forms of industry—the desire of mankind ssess various enjoyments which are only to be gained by r.

is would appear to be the natural course of social pro- . First, a man applies himself to a particular business se he has facilities for following it. One man lives by a and is a fisherman; another lives near the forest and game. Each could obtain more of this particular food he requires for his own use, and may desire some little y. Under these circumstances it is very natural that should effect exchanges with each other—not for the love of barter—but for the love of food. But such an nge could not be made between two men who both by fishing—nor between two others who both lived by ng; for under such circumstances neither party would anything to offer but that of which the other already had h. It is perfectly true that without barter no extensive on of employments can exist; but it is clear that barter immediate effect rather than the cause of such division. e influence of commerce upon the division of employ- s we shall have to speak presently; but in this place it ficient to show that the production of different commo- beyond the immediate wants of those who produce them es men to barter, by giving them something to offer in nge; and that afterwards the advantages derived from are an encouragement to further production of the same

hen this state of things has been once established, men themselves of all the natural advantages of their several positions, and apply themselves to the production of those commodities for which they have peculiar facilities. In one country minerals can be drawn from the bowels of the earth in unlimited abundance; in another the fruits of the earth teem upon its surface—fostered by a genial climate and a fertile soil. The inhabitants of these countries naturally seek to develop the resources of the earth which are within their reach. They labour effectively and produce abundance of their particular commodities, which they give in exchange for other things which they cannot produce themselves, but which they desire to enjoy: and thus a division of employments, by the aid of an extended commerce, distributes over the whole world the advantages of soil, climate, situation, and mineral productions, obtained by the experience and skill of men who have adapted their talents to the circumstances of each country.

Having thus hastily enumerated the several ways in which a division of employments adds to the efficacy of human labour, and increases the enjoyments of men, let us inquire in what manner it is restrained and limited. It may be collected from several of the preceding remarks, that the power of distributing men into particular employments must be limited by the extent of the market in which the produce of their labour may be exchanged. When there are no means of exchanging, men must provide everything for themselves that they require; and there is no further division of employments than that which necessarily takes place in families, and in the most simple forms of industry. So in every degree in which the situation and circumstances of men give facilities of exchange, do particular employments become assigned to individuals. A village draper sells all kinds of drapery, together with hats, shoes, coats, smock-frocks; nay, in some villages there is but one shop, in which nearly every kind of trade is carried on. In a populous city, on the other hand, trades are almost indefinitely subdivided. And why is this? Solely because of the extent of the market. In the one case, if a man sold nothing but hats, he could not gain a livelihood, and therefore he sells coats, smock-frocks, shoes, and all kinds of drapery—everything, in fact, which the people round about him are likely to buy. In the other case, there is so large a demand for hats, that a man can gain a better livelihood by the exclusive sale of them, than by a heterogeneous trade like that of the village shopkeeper.

But while, by means of exchange, employments are thus subdivided, the labour of many men is most efficiently combined in producing particular results. The combinations of industry for one object are often truly wonderful, while the employments of those who are really co-operating with one another are so distinct, that they are wholly unconscious of any combination at all; nor is their combination at once perceptible to others. If you ask a man 'who made his coat?'—he will naturally answer 'his tailor.' But ask him to enumerate the persons who had contributed to its production, and he will pause long before he attempts any answer, however incomplete. He will be reminded of the grazier, the shepherd, the wool-salesman, the various workmen in the cloth factory—the button-makers, the manufacturers of silk, and thread, and needles: but still the catalogue will be imperfect. In producing the raw materials, and in conveying, selling, and manufacturing them, the diversity of occupations is extraordinarily great. Each man attends to his own business, and scarcely thinks of its relations to the business of other people; and yet all are co-operating in the most effectual manner, for the most perfect and economical manufacture of this finished work of varied art.

The general operation of the principles of a combination of labour and division of employments has now been sufficiently explained so far as it relates to the efficiency of human industry. Of its effects upon the distribution of wealth (another important branch of political economy) no more need be said, than that by multiplying the modes in which industry is made productive, it is the main cause of the various grades of society which exist in all civilized countries. The different employments of men determine their social position as labourers or employers of labour; and the wealth arising from the effective employment of labour is distributed, through the several classes, as rent, profits, and wages.

It has been urged as an objection to an extended division of employments, that it unfits men for any change of business which altered circumstances may require; and that, on that account, great misery is caused when the demand for any particular kind of labour is reduced. Of this position the hand-loom weavers of England and Scotland are a familiar

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curious example will be found in the glossary annexed to the 'Report Commission on Frame-work Knitters,' 1845: and numerous others in upation Abstract of the Census Commissioners—counties of Lancaster, er, West Riding of Yorkshire, &c.

example, who are said to have been thrown out of employment by the extension of machinery. That they have been reduced to great distress is certain; but in their employment there was nothing to unfit them from engaging in power-loom weaving. On the contrary, the transition from one employment to the other would have been perfectly natural; but they preferred their independent life to the discipline of a factory, and for that and other reasons persisted in continuing in their old trade. In the mean time thousands of agricultural labourers and their families, whose occupations had been totally dissimilar, flocked into the manufacturing districts, and readily learned their new business. This example, therefore, instead of sustaining the objection, proves that a division of employments does not disable men, so much as might be expected, from transferring their labour to other departments of industry whenever a sufficient inducement attracts them. But any interruption or change in the ordinary course of industry is necessarily productive of temporary suffering to the working classes, from whatever cause it may arise; and an alteration in the forms of applying labour is but one out of many such causes. Yet much as this evil must be deplored, it is a satisfaction to know that it is only occasional, temporary, and partial in its operation, while the permanent welfare of mankind is promoted by all those means which render industry most productive and multiply the sources of human enjoyment.

Another objection to a minute subdivision of employments is, that it reduces vast masses of men to the condition of organized machines, uses them like tools, and uses them as such merely because machines have not yet been invented to do their work. From these facts, which are, to a certain extent, undeniable, it is inferred that the moral and intellectual character of men is degraded. This inference, however, is not supported by experience. Agricultural employments are less subdivided than trades and manufactures; but no one will contend that the farm labourer is ordinarily more intelligent than the operative, nor that his morals are decidedly superior. In comparing their relative condition, we shall be led into error if we confine our attention to the influence of a division of employments. In the lower departments of labour the work is rarely of a kind to enlarge the understanding, whether it consist of a combination of several occupations or of one only; and in either case the greater part of a man's time is engaged in his daily work. It is therefore to the circumstances by which he is surrounded, rather than to the nature of his work itself, that we must generally refer his condition. In thinly peopled countries there can be comparatively little division of employments, and in populous cities the principle of division, for reasons already explained, is carried very far. In the one case the intercourse of persons with each other is very confined, and is enlivened with scarcely any variety; in the other case persons are crowded together, and brought into continual intercourse. These opposite circumstances produce different results for good and for evil. The intelligence of mankind is unquestionably increased by extended intercourse with one another: their morals, at the same time, are more liable to corruption. In large cities they are exposed to more temptations—they are under less restraint; and above all, they have, almost universally, higher wages, which enable them to indulge their propensities more freely. Much of the intellectual disparity of rural and town populations might be removed by an efficient system of education, by which men would be better qualified to observe and reflect upon the objects by which they may be surrounded; and great would be the moral influence of education in rendering high wages innocuous, by offering liberal sources of recreation to the operative, more attractive than the temptations of vice.

But to all objections it may be answered, that a division of employments is an imperative law of civilization. So overpowering is the necessity of a combination of labour with a distribution of distinct employments, for the production of wealth, that Mr. Wakefield has ingeniously ascribed to it the origin of slavery, in countries where labour has not been accessible by means of wages. (See Note to Adam Smith, book i. ch. 1.) Where land is abundant, families naturally scatter themselves over it, and provide for themselves nearly all that they want. More than they want they do not produce, as there is no market; and the growth of capital, under such circumstances, is impossible. One man has no inducement to offer to another for his labour; and thus the strongest men, with dominant wills, finding the necessity of combined industry for any extensive production, wage war upon their weaker neighbours and compel them to work by force. But where land becomes scarce and dear, men are forced into other employments distinct from agriculture; capi wages are offered as an inducement to work, and wealthy and populous a country becomes, the more must be the distribution of separate employments. to a division of employments, therefore, is no le object to civilization altogether; for the two cond inseparable. It is deeply to be lamented that m have hitherto clung to the progress of civilization, not its necessary accompaniments. Many of them referred to the slow growth of political science, and corrected by the application of sound principles of ment; many may be attributed to the neglect of the and moral culture of an *increasing* population: but deed must be the sight of any man who would seek them by applying to a civilized state the rude exp barbarism.

(Adam Smith's *Wealth of Nations*, book i. chap 3, with Notes by M'Culloch and Wakefield; M' *Principles of Political Economy*, &c.)

DOBERAN is a market-town in the grand-duchy lenburg-Schwerin, situated in 54° 5′ N. lat. and 12° It had a chapel so early as the year 1164, and in Prince Pribislav built a church and convent. The was peopled by a great number of Cistercian mo Brunswick; but in seven years it was plundered Wends, or Vandals, and seventy-eight monks were m Prince Henry Borowin I. laid the foundation of a ne and convent in 1188, on the spot where Doberan now the church was consecrated in 1232. Extensive lan perty was granted to the convent, and though it wa destroyed by lightning in 1291 and not thoroughly till 1368, its wealth and importance increased from year. Pilgrims came from distant countries, even fro to see the numerous relics in the church. But the tion put an end to the prosperity of the convent. John Albrecht secularised it in 1552, and added sive possessions to his domains. Doberan suffered much in the Thirty Years' War. Doberan is inde its present thriving condition to the foundation of blishment for sea-bathing in 1793. This was the fi kind established in Germany, and this little town ha a celebrated and much frequented watering-place. are about three miles from the town. A good ro dered with trees, leads to the baths, through a fine and plantations of oak and beech. The bathing-hous called, is only thirty paces from the coast of the Bal which it is supplied with sea-water by pipes and pump building is 166 feet in length, and contains every a dation for warm and cold bathing, shower-baths, dou There are likewise bathing-machines in the open se beran is situated in a pleasant valley, and the s ing country is very agreeably diversified. The town 3000 inhabitants. Among the public buildings the teresting is the church, unquestionably the finest spe antient Gothic architecture in Mecklenburg, next Peter's church at Rostock. It contains many monu the dukes of Mecklenburg, and a great number of and statues. The stained-glass windows are much There are two palaces belonging to the grand-duke, and various buildings for the accommodation of visito baths, who are generally about 1500 in the season. bathing establishments are the private property of th duke, and are managed on his account. The visitors ar from the neighbouring states of the North of Germ from England.

A singular dam, called the Heiliger Damm, or Ho extends from the bathing-house to the village of Re it is above three miles long, from 60 to 100 feet bro 16 feet high. This has been cast up by the Baltic, gradually; but there is a tradition that it was cast u night, perhaps by an earthquake. It is entirely com boulders of different sizes and of a great variety of colours.

(G. Hempel, *Mecklenburg*; Brockhaus, *Conve Lexicon*.)

DOBSON, WILLIAM, was born in the parish Andrews, Holborn, in 1610. He was a very distin painter, and succeeded Vandyck in the favour of Ch who used to call him the English Tintoret. Vertue some interesting particulars respecting Dobson. H was of a good family of St. Albans, but being at le poor circumstances, his son was apprenticed to Mr. afterwards Sir Robert Peake, painter and picture-deal a shop at Holborn Bridge; but he learnt more, accord- to R. Symonds, of Francis Cleyn, a German, who stood in great favour with Charles I.

r Robert Peake set Dobson to copy pictures for him, and sed the copies for sale in his shop-window. One of these s was seen by Vandyck in a shop-window on Snow Hill, having made inquiries for the artist, he found him at in a poor garret, whence he took him and introduced to the king. After the death of Vandyck, Charles I. ap- ted Dobson sergeant-painter and groom of the privy- nber, and he accompanied the king to Oxford, where he ted the king, Prince Rupert, and many of the nobility. Rebellion however, and his own extravagance together, Dobson into difficulties, and he was thrown into prison debt, from which he was released by a Mr. Vaughan, whose trait he painted, and he considered it his best work in that s. He did not long enjoy his liberty: he died in London 1646, aged only thirty-six, and was buried at St. Martin's-the-Fields.

Dobson painted portrait and history equally well, and his traits are generally considered so excellent, that he has n termed the English Vandyck, to whom he was but e inferior in this branch of art, and his reputation was ivalled by that of any English painter until the appear- e of Sir Joshua Reynolds. There are several excellent orical pictures by Dobson in various parts of England. re is a Beheading of John the Baptist at Wilton, in ch the head of John is from Prince Rupert; at Albury, urrey, the seat of the earl of Arundel, there was a Woman n in Adultery, with several figures, the heads being por- ts, and among them was the poet Cowley; at Blenheim is ncis Carter, an architect and pupil of Inigo Jones, with family, a picture, says Walpole, equal to anything he had r seen by Dobson. Walpole mentions several other family ces, and many portraits with one or more figures, of which particularly praises one at Drayton, in Northamptonshire, Henry Mordaunt, earl of Peterborough, in armour, with a e holding his horse and an angel giving him his helmet. lpole says further, 'Dobson's wife, by him, is on the stairs he Ashmolean Museum at Oxford; and his own head is Earl Paulett's: the hands were added long since by Gib- as he himself told Vertue.' He also etched his own ait. Dr. Waagen mentions a few pictures by Dobson ch are not noticed by Walpole, all of which he uniformly es, except in the colouring, which he considers inferior. sidering Dobson's short life and the very unsettled period hich he lived, a great proportion of his works must be preserved, and it is to be regretted that there is not a e specimen of 'the English Vandyck' in the British onal Gallery. Dobson is said by D'Argenville to have the first artist to adopt the system of requiring half the ent of a portrait at the commencement of it: he did it to e the number of his sitters to within a practicable limit.

Valpole, *Anecdotes of Painting*, &c.; Waagen, *Kunst- e und Künstler in England*; D'Argenville, *Abrégé de la des plus fameux Peintres.*)

OCKET. [BANKRUPT, P. C.]

ODD, THE REV. WILLIAM, LL.D., was born in , at Bourn, in Lincolnshire, of which place his father vicar. In 1745, he was admitted a sizar of Clare Hall, bridge, and took his bachelor's degree with reputation in . Soon afterwards he removed to London, where he racted an imprudent marriage. In 1753, he received st's orders from the Bishop of London; and from this he continued to obtain a succession of small preferments he church, holding, in the latter part of his life, two pels in London with a rectory and vicarage in the country, possessing an ecclesiastical income of eight hundred a r. His character as a popular preacher, and as a man of ers, aided by his assiduous courtship of persons of rank, cured for him patronage of a high order. He was one of king's chaplains till he was displaced for a simoniacal r; and, in 1763, he was intrusted with the education of ilip Stanhope, afterwards the famous Earl of Chesterfield. ring all this time his literary activity was great and varied. February, 1777, he was arrested on a charge of having ed the signature of his late pupil, Lord Chesterfield, to a d for four thousand pounds, of which he had obtained ment. He repaid the money, but was brought to trial and victed. He was executed on the 27th of July, 1777. The ings of this unfortunate person are numerous, and in their er exceedingly various. There are poems, among which 'A New Book of the Dunciad,' published anonymously in 1750; and the blank verse poem, called 'Thoughts in Prison,' which was composed in the interval between his conviction and execution. Among the prose works are many sermons, and the well-known 'Reflections on Death,' 1763. A work of another character is his 'Beauties of Shakspere,' in which, besides the extracts which make up the body of the volume, are interspersed many criticisms. These, like Dodd's other works, are fluent and tasteful rather than original or vigorous. Indeed some of them are mere plagiarisms. It is worth while to observe, that just before his apprehension he had entered on negotiations for publishing an expensive edition of Shakspere's works; and that the desire of raising money for the engraving of the plates has been assigned as most probably his reason for committing the forgery.

DODWELL, EDWARD, F.S.A., was a man of fortune, and was educated at Trinity College, Cambridge. He left the University in 1800, and from that time till his death in May, 1832, he mostly resided abroad, and occupied himself in researches connected with the earlier antiquities of Greece and her colonies. The first results of his investigations and studies in this field he gave to the world in 1819, in two quarto volumes entitled 'A Classical and Topographical Tour through Greece during the years 1801, 1805, and 1806.' This learned and accurate work was followed in 1821 by a folio volume of 'Views in Greece, from Drawings by Edward Dodwell, Esq.,' containing thirty coloured prints, accompanied by short descriptions in French and English, from a collection of nearly a thousand drawings which he had made of architectural objects and natural scenery. In the summer of 1830 Mr. Dodwell brought on a severe illness by fatigue and long exposure to the sun while engaged in seeking for the situation of some antient cities in the Sabine Mountains; and from this he never completely recovered. He left on his death a very large collection of drawings; from which a folio volume of lithographic plates was published at London, in 1834, under the title of 'Views and Descriptions of Cyclopian or Pelasgic Remains, in Greece and Italy; with Constructions of a later period; from Drawings by the late Edward Dodwell, Esq., F.S.A., and member of several foreign academies; intended as a Supplement to his Classical and Topographical Tour in Greece,' &c. Of the views, 71 are Grecian, 55 Italian. The subject of the early architecture called Cyclopian (or sometimes Titanic) had been slightly discussed by Dodwell in his 'Tour;' and it had engaged much of his attention in the last years of his life: he had been in correspondence about it with M. Petit Radel of Paris, and other learned persons, and it was his urgent request to the person to whom he bequeathed his drawings, and by whom the last-mentioned volume was afterwards edited, that the collection of views of which it consists should be published. The descriptions by which the plates are accompanied are extremely brief.

(*Editor's Preface to the Views of Cyclopian Remains; Mr. Dodwell's Works.*)

DOG-WOOD. [CORNUS, P. C. S.]

DOLOMITE. This rock, having the aspect and general geological history of limestone, but composed of carbonate of magnesia united to carbonate of lime, usually atom to atom, occurs as a part of the oolitic system of the Alps and Apennines, and of the German Jurakalk; and it is perhaps proper to call by the same name the crystallized magnesian limestone of Nottinghamshire, Derbyshire, Yorkshire, and Durham. The best example of this English dolomite is at Bolsover, in Derbyshire, from whence the stone is taken to build the new Houses of Parliament. From the manner in which this rock occurs along the Lake of Lugano, and other parts on the south side of the Alps, in direct contact, or more frequently in a peculiar relation of propinquity to augitic traps, Von Buch inferred that dolomite was a metamorphic limestone, altered by absorption of magnesian vapours yielded by volcanic action. There is much to recommend this inference. In England we frequently find the mountain limestone *dolomitized*, along lines of fracture and along the sides of mineral veins; and these cases appear to enter into Von Buch's explanation. But the broad magnesian limestones of the North of England are certainly due to original crystallization together of the two carbonates already named. Dolomite is usually very deficient of organic remains. In the Alps and in Franconia its aspect is very picturesque.

DOMAT, or DOUMAT, JEAN, a distinguished French civilian, was born at Clermont in Auvergne, on the 30th of November, 1625. He connected himself with the brilliant circle of literary recluses at the Port Royal among whom his

Descriptions of new Plants from Nepaul in the Herbarium of A. B. Lambert, Esq., vol. 3.

Illustrations of the Natural Family of Plants called Melastomaceæ, vol. 4.

A Monograph of the genus Pyrola, vol. 5.

On the classification and division of Gnaphalium and Xeranthemum of Linnæus, vol. 5.

The following papers were published in the 'Edinburgh New Philosophical Journal:'—

Observations on Philadelpheæ and Granateæ, two new families of plants.

On the affinities of Empetreæ, vol. 2.

On the Rhubarb of Commerce, the Purple-coned Fir of Nepaul, and the Mustard-Tree, vol. 2.

Description of the genus Malesherbia, of the Flora Peruviana, with remarks on its affinities, vol. 2.

Observations on the Cow-tree of the Caracas, and on the culture of the Nutmeg, vol. 3.

Remarks on the irritability of the Stigma, and on the origin and nature of certain parts of the fructification in Pinus Larix, vol. 4.

On the general presence of Spiral Vessels in the Vegetable Structure, vol. 6.

Descriptions of the genera Columellia, Tovaria, and Francoa, vol. 6.

An attempt at a new classification of the Cichoraceæ, vol. 6.

On the characters and affinities of Darwinia, Brunfelsia, Browallia, Argylia, Eccremocarpus, and of a Plant improperly referred to the latter genus, vol. 7.

On the affinities of Vellozia, Barbacenia, Glanx, Aucuba, Vivinia, Deutzia, and of a new genus of the order Rubiaceæ, vol. 8.

On the anomalous structure of the leaf of Rosa Berberifolia, vol. 8.

A Monograph of the family of Plants called Cunoniaceæ, vol. 9.

On the characters and affinities of certain genera chiefly belonging to the Flora Peruviana—various papers, vols. 10, 14.

Descriptions of some new species of Malesherbia, Kageneckia, Quillaja, and of a new genus of Salicariæ, vol. 12.

Additional remarks on Ercilla, Macromeria, Aitonia, and Citronella, vol. 14.

On the Coniferæ at present growing in Australia, vol. 14.

On the characters and affinities of the genus Codon, vol. 15.

On the connexion between the Calyx and Ovarium in certain Plants of the order Melastomaceæ, vol. 15.

Some remarks on the Plant which yields the Cascarilla Bark, vol. 16.

An attempt at a new arrangement of the Ericaceæ, vol. 17.

On the characters of certain groups of the class Personatæ, vol. 19.

These numerous works are sufficient proof of his industry, and they have a real value. Don's knowledge of plants was most extensive, and his appreciation of species ready and exact. He was not, however, fully alive to the importance of studying plants in their morphological relations, and many of his papers are open to criticism on this ground. His constitution was robust and strong, but at the end of 1840 a malignant tumor appeared on his lip, which, although removed at first, speedily reappeared, and terminated his existence on the 8th of December of the same year.

(Proceedings of Linnæan Society.—Don's *Works.)*

DONEAU, Latinized DONELLUS, HUGUES, a lawyer, was born at Châlons-sur-Saône, in France, in 1527. He is said to have been idle in his youth, and an anecdote is preserved, according to which he was frightened into diligence by a threat of his father to have him brought up as an assistant to a swineherd. He studied literature at Tournon and jurisprudence at Toulouse, and subsequently at Bourges, where he took a degree as Doctor of Laws, in 1551. He soon afterwards began to teach jurisprudence at Bourges, and continued to do so till the massacre of St. Bartholomew, in 1572. He had embraced the opinions of the Huguenots, and, dreading to be involved in ruin with others of his persuasion, he made his escape to Geneva, being aided by his pupils, among whom he seems to have been popular, and who had determined to defend his person if he were attacked. After having remained a short time in Geneva, he was called by the Calvinist Elector Palatine Frederic III. to be Professor of *Law at Heidelberg.* Ludwig IV., the successor of this prince, *who did not follow* his religious opinions, made changes in
the university which drove Doneau thence, and leavi
delberg, in 1579, he settled in Leyden. Having ado
faction in favour of the Earl of Leicester, he was o
leave Holland and return to Germany. He died at
the 4th of May, 1591. He was a voluminous com
His earliest work appears to have been 'In titulum d
in Pandectis Commentarius,' Paris, 1556. A colle
his commentaries was published in five volumes,
Frankfort, in 1596, and again in 1626, with the title
mentariorum de Jure Civili libri xxviii., ex recension
supplementis Scipionis Gentilis.' One of the most
extant lists of Doneau's works will be found in the
catalogue of law books in the Advocates' Library, Ed
His Life is in the Supplement of *Les Vies des plus*
Jurisconsultes, by Taisand.

DONELLUS. [Doneau, P. C. S.]

DONOVAN, EDWARD, a writer on various dep
of Natural History. One of his earliest publications
Natural History of British Insects.' This work w
menced in 1792, and finished in 1816. The whole w
prised in sixteen volumes, octavo. Although at t
these works were published, especially the earlier vol
was of great assistance in the study of Entomology,
been surpassed both in execution and matter by more
works. It will however always be an important wor
history of the literature of Entomology. In 1794 h
lished a little work on the formation of museums of
history, entitled 'Instructions for Collecting and Pre
various subjects in Natural History,' 8vo., London.
1794 to 1797 he published at intervals four volumes of
containing drawings and descriptions of British Birds,
'The Natural History of British Birds,' 8vo. In 1
commenced a series of illustrated works on the insects
These were called 'An Epitome of the Insects of
1798, 4to., London; 'An Epitome of the Natural
of the Insects of India,' 1800, 4to., London. 'An E
of the Insects of Asia,' 1798-1805, 4to., London,
These works had an extensive sale, and did much for
a taste for the study of general entomology. In 1
published a work entitled 'Descriptive Excursions
South Wales and Monmouthshire in the year 1804 a
preceding Summers,' London, 2 vols. 8vo. In 1823 h
menced a periodical work entitled 'The Naturalist's
sitory, or Monthly Miscellany of Exotic Natural H
Of this work three volumes appeared containing des
and drawings of various animals from different par
world. He also published 'An Essay on the Minute
Plants in general.'

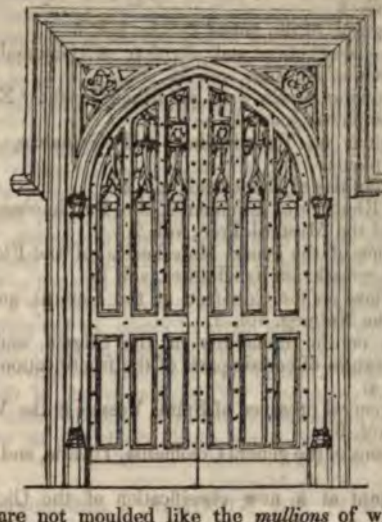
Although constantly occupied on his various wo
profits from them seem to have been small. So gr
his dissatisfaction at the small profits which he recei
the publishers of his works, that in 1833 he publis
Memorial respecting my Publications on Natural His
which he endeavours to prove that whilst he had been
those who sold his books had realised large sums.

Science is not indebted to Donovan for any new d
or important generalisation; but the field which his
occupied was an important one, and his illustrated wo
done much to diffuse a knowledge of and engender a
the study of natural history. He died on the 1st of F
1837.

DOOR. In every style of architecture doors (
properly speaking, doorways) are important featu
entrance into a building being naturally marked out
ration, if only by its situation as a central and th
principal point in the general design; consequent
where doors and windows are treated nearly alike, th
are distinguished from the other apertures, either by
larger dimensions, or by being embellished more ela
For the mode of decorating doorways in classical arch
or the Temple style of the antients, we refer to th
Door, in this Cyclopædia, merely adding, in the wa
ther remark, that they and columniation furnished al
only features of design in such structures, windows
but totally unknown to them; and even as to doo
selves, there was only a single lofty one within
forming the façade of a temple, a circumstance not
to by every one, because generally overlooked by t
give us classical porticos far more scrupulously lit
need be in regard to columniation, yet having intern
paratively small doors, if not windows also. In the
style the dressings of doorways are very simple com
however elaborately their details may be enriched;

the architrave mouldings forming the jamb of
a standard fixed proportion to the width of the
or itself, which last generally fills up the entire
ot where what answers to a modern *fanlight* is
he door and the lintel of the doorway, as in the
sta of Tivoli, that of Hercules at Cora, and the
ome, in all which that space was filled in with
work in metal, for the admission of air and
a door and window over it were united into
n. The two last-mentioned examples are fur-
le, as instancing the mode resorted to for en-
orway to the proportions required by the rest of
vithout increasing the aperture in the same
, by filling up the space between the archi-
and the door by antæ or pilasters, as is shown
Door, vol. ix. p. 86.* In Gothic architecture
tion of the aperture of doorways was practised,
ore properly be termed in that style, any re-
of *extension* could be given to the general
oorway by merely increasing the depth of the
hich the door was placed, and the number of
ther mouldings enclosing the opening; by this
vould else have been a comparatively insignifi-
was rendered an important and highly orna-
ven in the most magnificent portals, and in the
largest structures, in the Gothic or Pointed
s themselves are usually of moderate size, and
besides frequently divided into two by a cen-
shaft; whereas very spacious and lofty doors
en attended with the inconvenience of exposing
o much, whenever they were opened. Little
refore, and not much more knowledge of the
shown in making the entrance-doors of Font-
the preposterous height of thirty feet, dimen-
ld have been lofty to excess even for a gate-
uch a one as the beautiful Erpingham Gate at

oorways the side splays and the arch or arch-
ve may be enlarged or increased to almost any
at without producing heaviness, or looking like
ecoration. In many instances the width of the
ings around the opening is equal to the width
itself; and in some the former even exceeds
nd this breadth of splay, it should be observed,
arked distinction between doors and windows in
yle; for though the apertures of both kinds
ble each other in general shape and design, the
mit, under any circumstances, of anything like a
ment of their external dressings. Never is a
attempted to be made a principal and orna-
by means of a deep splay filled in with decora-
is a large one placed within a wide and deeply-
, bearing the same proportions to the aperture as
parts of a doorway generally do to each other.
ifference of treatment—so fortunate in itself,
conduces to æsthetic variety—a merely arbitrary
ctated by sound architectural propriety; for a
w is not a mere gap in the wall, standing in
al dressings to render it an ornamental feature;
ry it furnishes its own decoration, and the
dow the more numerous the mullions, and the
the tracery; consequently, all the more rich
the window. Another difference between
ys and windows is, that in the former the doors
sometimes square-headed, the apertures being
ly to the spring of the arch, in which case
, or space between the opening and the arch, is
n with sculpture. A third difference between
dows—at least to doors in the Perpendicular
for the doors the general design is formed
-headed composition, and surrounded in its
a series of external weather-mouldings termed
lthough labels are a very general, not to say
mpaniment to windows in the Tudor or per-
nestic style, they are almost unknown for large
a head formed by a single arch. The an-
, from the Bishop's Palace at Lincoln, not only
l composition of a labelled doorway, but also
nnelling and the species of tracery employed for
the doors themselves; which, though quite in keeping with, is still of quite distinct design from the corresponding parts of windows. It will be observed that the *munnions*, as they are termed, are not moulded like the *mullions* of windows (to which they answer), but merely form the general surface upon which the pannels are sunk, and are decorated by being *studded* with large-headed metal nails. Almost as frequently as not, instead of being divided by a cross rail, or *style*, the pannels are continued from top to bottom. In more ancient examples the doors are generally plain; that is, not pannelled, but are decorated with large metal hinges of rich and fanciful scroll-work pattern; also with similar ornaments round the door handles and locks. Of such ornamental metal-work upon doors some elaborate specimens are given in Heideloff's 'Ornamentik des Mittelalters.' For an example of a doorway of unusually ornate design, extended by canopied niches on its sides, we refer to that from King's College Chapel, Cambridge, in the article Gothic Architecture, P. C. p. 326. To treat satisfactorily of so multifarious a subject as that of doors and doorways in Gothic architecture would require a work devoted to them alone, after the manner of Donaldson's publication on doors, but would form one of considerably greater extent.



DOPPELMAYER, JOHANN GABRIEL, a German mathematician, born at Nürnberg in 1671, was the son of a trader in that city, who had distinguished himself by his taste for physics, and is said to have made some improvements in the air-pump.

He was sent for instruction to Altorf, and he completed his education at the university of Halle: here he applied himself to the study of the law; but, abandoning this pursuit, he cultivated with diligence the different branches of natural philosophy. In the year 1700 he made a journey to Basle; from whence he proceeded to Holland, and he subsequently made a visit to England. After an absence of two years he returned to Nürnberg, where, in 1704, he was appointed professor of mathematics and astronomy; and this post he held during the remainder of his life. In December, 1733, he was admitted a fellow of the Royal Society of London; and in 1740, a member of the Academies of Sciences at St. Petersburg and Berlin. He died December 1, 1750.

Doppelmayer was acquainted with the French, Italian, and English languages, besides Latin and his native tongue: he acquired, at a time when such manual operations were not below the attention of Sir Isaac Newton, considerable skill in grinding lenses for object-glasses, and in polishing specula for reflecting telescopes; and in the latter part of his life he distinguished himself by the performance of electrical experiments.

He published, in German (1714) and also in Latin (1731), an Introduction to Geography, as an accompaniment to the Atlas of Homann; Notices of the Mathematicians and Artists of Nürnberg, in German (1730); and a Celestial Atlas engraved on thirty plates, with descriptions in Latin (1742). He published a translation, in Latin, of Street's Astronomical Tables; also translations, in German, of Wilkins's Defence of Copernicus, and of Bion's 'Traité de la Construction, etc. des Instrumens d'Astronomie.' But his principal work is one entitled 'Neu-entdeckte Phænomena von Bewunderns-würdigen Würckungen der Natur, welche bey der fast allen

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opportunity of correcting an awkward mistake in the cut
the divisions on the scale are figured as representing *ten*
they ought to be only five, the entire width of the doorway
ght but twenty-four feet.

Cörpern zukommenden electrischen Kraft in einem Systemati vorstellig gemacht,' 4to., Nürnburg, 1774.

DORE'MA, a genus of plants belonging to the natural order Umbelliferæ. It has an epigynous cup-shaped disk; the fruit slightly compressed from the back, and edged; 3 distinct piliform primary ridges near the middle, and alternating with them 4 obtuse secondary ridges, the whole enveloped in wool; vittæ 1 to each secondary ridge, 1 to each primary marginal ridge, and 4 to the commissure, of which 2 are very small.

D. ammoniacum, is a glaucous green plant, with a perennial root, large leaves 2 feet long, somewhat bipinnate, the pinnæ in 3 pairs, the leaflets inciso-pinnatifid, with oblong mucronulate entire or slightly lobed segments, from 1 to 5 inches long and ½ to 2 inches broad, the petiole very large downy and sheathing at the base; the teeth of the calyx acute membranous minute, the petals ovate, reflexed at the point; the fruit elliptical, compressed, surrounded by a broad flat edge. This plant is a native of Persia, in the plains of Yerdekahst and Kumisha in the province of Irak; and near the town of Jezud Khāst in very dry plains and gravelly soil, exposed to an ardent sun. This plant is one of those which yields gum ammoniacum, but it is probable that there are several species of plants which yield this as well as the other gum resins of the order Umbelliferæ.

(Lindley, *Flora Medica.*)

DORIGNY, SIR NICOLAS, a distinguished French designer and engraver, was born at Paris in 1657. He was the son of Michel Dorigny, who married Vouet's daughter, but his father died when he was very young, and Nicolas was educated as an advocate. His taste however led him to follow the arts as a profession, and he accordingly went to his brother Louis at Rome, who was a painter and engraver, and put himself under his tuition. He lived twenty-eight years in Italy, devoting his time chiefly to etching and engraving, and he became one of the first of the French historical engravers in his style, being inferior to Girard Audran alone. His works are however very hard, though they are drawn with great vigour and abound in expression, and his bold heavy lines appear to have been executed with extreme ease; but there is no delicacy of light and shade or tone in any of his works.

Dorigny engraved many celebrated Italian paintings during his long stay in Italy, including three of the best pictures in Rome: the Transfiguration, by Raphael, in 1705; the Taking down from the Cross, by Daniele da Volterra, in 1710; and the Lame Man healed by St. Peter, by Cigoli: he engraved also the Gallery of Cupid and Psyche after Raphael.

He became acquainted at Rome with some English gentlemen, who persuaded him to visit England for the purpose of engraving the cartoons of Raphael. He arrived in England in 1711, and commenced his task in the spring of the following year: Queen Anne had given him a room in Hampton Court, with the necessary perquisites. The expense was defrayed by subscription at four guineas the set. The prints were, with the assistance of Charles Dupuis and Claude Dubose, finished April 1, 1719, when he presented two complete sets to George I., who gave him a purse of 100 guineas, and knighted him in the following year. As his sight at length failed him, he determined to desist from further practice, and in 1723 he made a sale of his drawings, and in 1724 returned to Paris. His drawings were sold for 320*l.*, at the sale of which the drawings of the cartoons brought 52 guineas, and a lot of 104 heads and other studies from them, 74*l.*

These heads were afterwards engraved by various French artists, and published with some other studies by John Boydell, under the title 'The School of Raphael, or the Student's Guide to Expression in Historical Painting; illustrated by examples engraved by Duchange and others, under the inspection of Sir Nicolas Dorigny, from his own drawings after the most celebrated Heads in the Cartoons at the King's Palace.'

Dorigny was elected a member of the French Academy of Painting in 1725, and died at Paris in 1746. He engraved altogether 153 plates, according to Vertue.

His elder brother Louis was a good fresco-painter: he lived chiefly in Italy, and died at Verona in 1742, aged eighty-eight.

(Vertue, *Catalogue of Engravers*, &c.; Watelet, *Dictionnaire des Arts*, &c.; Huber, *Manuel des Amateurs*, &c.)

DORO'NICUM, a genus of plants belonging to the natural order Compositæ, to the suborder Corymbiferæ, the tribe Senecionidæ, and the section Senecioneæ. It has the florets of the ray ligulate and pistilliferous; those of the disk tubular,
with both stamens and pistils; the involucre hem
2 or 3 rows of equal scales; the pappus pilose,
ray. The species are deciduous herbaceous
are natives of Great Britain.

D. pardalianches, with cordate denticulate le
a stem from 2 to 3 feet in height, erect, solitary
hairy. It is a rare plant, and found in damp
and pastures. It has its specific name from
and ἄγχειν, to strangle, on account of the use sa
have been made of the plant for the purpose
wild animals. With the species of Arnica, and
of the order it has the common name of Leopard

D. plantaginerum, the second British speci
leaves, and the stem-leaves clasping. It attai
same height as the last, and its flowers are also
scorpioides, *D. caucasicum*, *D. austriacum*, and
ches are natives of the continent of Europe.

(Koch, *Flora Germanica*; Babington, *Manual*

DORTMUND, the capital of a circle of the
the government of Arnsberg, in the Prussian prov
phalia, is situated in 51° 30′ N. lat. and 7° 27′
a very pleasant fertile country on the banks of
It is an old-fashioned ill-built town, and surro
wall with five gates. There are four Lutheran
one Roman Catholic, three hospitals, and
illustre, founded in 1543, a private lunatic
poor-house. It was formerly a free imperial city,
ber of the Hanseatic League, had the privilege
money, and exemption from duties of custom
empire. It is the seat of several tribunals, and
mining offices for the provinces between the We
Rhine. The inhabitants, who are about 7000,
tories of linen, woollen, and cotton, nails, tobacco,
great breweries, and an extensive trade in corn
productions. In 1802, the town was allotted
cation to Nassau-Diez, and passed in 1806 to the
of Berg, when it became the capital of the dep
Ruhr: in 1818 it was transferred to Prussia.

(Hassel, *Die Preussische Monarchie*; Stein, Geog
Cannabich, *Lehrbuch*; Müller, *Wörterbuch de*
Staates.)

DOSSI, DOSSO and GIOBATTISTA, two
Ferrarese painters of the early half of the sixteen
They were born about 1480-1490, in Dosso,
and first entered the school of Lorenzo Costa,
whom they studied together six years in Rome,
in Venice. Though they always worked together,
constantly disputing: Giobattista, the younger,
and his disposition was the type of his body;
fit to be employed in the accessory parts of pain
great skill in landscape and in decoration, but
human figure. Dosso, on the other hand, was a
figure, and Giobattista was always employed by
and Ercole II., dukes of Ferrara, together with
and was forced to execute the accessory parts of
pictures.

There are still several of their joint works in
rara; they made the cartoons of the tapestries in
of Ferrara, and of those in the palace and in Sa
at Modena, representing the deeds of the fam
which, according to Vasari, Pordenone was com
Ercole to execute, but he died in 1540, by poison
shortly after his arrival at Ferrara for the pur
mentions the two Dossi with unjust depreciation
praised and enumerated by Ariosto among the
painters of Italy and the immortal artists of G
enumerating the latter, Ariosto says (*Or. Fur.*

> 'E quei che furo a' nostri dì, o sono ora,
> Leonardo, Andrea Mantegna, Gian Bellino,
> Duo Dossi, e quel ch' a par sculpe e colora
> Michel, più che mortale, Angel divino;
> Bastiano, Rafael, Tizian,' &c.

Dosso painted the portrait of Ariosto, and m
tions to the Orlando Furioso; he painted also
Ariosto in a picture of Paradise on the ceiling
bule of the refectory of the convent of San Bene
rara: the portrait is in the possession of the
Sciences of Ferrara, formerly the Academy Degli

There is a good collection of Dosso's oil pain
gallery of Dresden, where there are several of hi
best of which is the four fathers, Saints Gregory
Augustus, and Jerome, disputing on the miraculo
of the Virgin; the figures are of the size of life,

he hardness of the early Italian schools. Dosso
rother some years: he died about 1560.
ida di Ferrara; Lanzi, *Storia Pittorica*, &c.;
ges en Italie.)

FRANCIS, was born in 1762. He was the
of Thomas Douce, who was one of the Six
Clerks, P. C.] Francis was sent to school
in Surrey, where he learnt Latin and some
afterwards held a situation in the Six Clerks'
ather died in 1799, having previously resigned
ce as one of the Six Clerks. The bulk of his
rty, which was very considerable, was bequeathed
rother, and the rest was left to himself and his
cis Douce's share was about 5000*l.* in money
ents of houses, besides the emoluments of his
were large. He married in 1799, but his wife's
ot suit him, and he himself was very irritable,
d together uncomfortably. They seem to have
ren. A very large addition was made to his
823, by Nollekens, the sculptor, who made him
ecutors, and left him nearly one-half of the for-
had accumulated. [Nollekens, P. C.] Douce
of the Antiquarian Society, and was in habits
tercourse, both personal and by correspondence,
l the leading antiquarians of his time. He was
tor of scarce books, prints, coins, medals, and
urious antiquities. He died at his residence in
, London, March 30, 1834.
ished, in 1807, 'Illustrations of Shakspeare and
ners,' 2 vols. 8vo. London. The book was
d by some of the reviews, and the author was
ed. He also published, about the beginning of
Dance of Death, exhibited in elegant Engravings
h a Dissertation on the several Representations
ct, but more particularly of those ascribed to
Hans Holbein, by Francis Douce, F.A.S.,
ondon. The substance of the dissertation had
ut forty years before, in illustration of Hollar's
lished by Edwards, of Pall Mall, London. The
f which there were forty-nine, were executed
d Byfield, two of the best engravers on wood
These are the only works which Douce published
He has some essays in the 'Archæologia,' and
y communications by him to the 'Gentleman's

a mere antiquarian. As a critic on Shakspere,
re of little value when true, and they are fre-
eous, though sufficiently arrogant. As an illus-
nt manners, he has been more successful.
amount of money he bequeathed to two friends,
any sums of 1000*l.* and under to relations and
his antiquarian associates. His printed books,
gs, illuminated manuscripts, coins, and medals,
Bodleian Library, Oxford. His miscellaneous
left to Dr. Meyrick, of Goodrich Castle, Wales.
pts of his own writing, together with all his cor-
he directed to be enclosed in a strong box, and
d given to the British Museum, with this inscrip-
box, 'Mr. Douce's Papers, to be opened in the
If the British Museum refused to accept the box
s, it was then to be given to the Bodleian Li-
will contains another curious direction—'I give to
Carlisle 200*l.* either to sever my head or to extract
my body, so as to prevent my return to vitality.'
's Magazine, 1834.)

S, DAVID, was born at Scone, in Perthshire,
re his father was a working mason. He re-
education at the parish school of Kinnoul, and
ced as an apprentice in the garden of the earl of
Scone Palace. As a lad he was remarkable for
or books and the study of plants. In the winter
is evenings to reading, and in the summer to
ical excursions for the purpose of collecting the
f the neighbourhood. In 1818 he went to live
, the seat of Sir Robert Preston, Bart., whose
en celebrated for its choice collection of exotic
e he was treated by the head-gardener, Mr.
great kindness, who procured him access to
valuable botanical library. From Valleyfield he
lasgow, where he was employed in the botanic
e university. His intelligence attracted the at-
. (now Sir William) Hooker, who was the pro-
ny at Glasgow, and he made him his companion in his botanical excursions for the purpose of collecting materials for his 'Flora Scotica.' By Sir William Hooker he was recommended to the Horticultural Society of London as a botanical collector, and in 1823 he was sent to the United States, where he procured many fine plants, and greatly increased the collection of fruit-trees in the possession of the society. In 1824 he was sent by the Horticultural Society to explore the vegetable productions of the country adjoining the Columbia River, and southwards towards California. The vessel in which he went out touched at Rio de Janeiro, where he collected many rare orchidaceous plants and bulbs. In the course of his voyage round Cape Horn he shot many rare and curious birds. He visited the island of Juan Fernandez, which he describes as 'an enchanting spot, being fertile and delightfully wooded.' Here he sowed a quantity of garden-seed, with the wish, he says, that he might 'add to the collection of a second Robinson Crusoe, should one appear.' He arrived at Fort Vancouver, on the Columbia River, in April, 1825. During his journey he sent home from time to time large numbers of beautiful plants, with seeds and dried specimens. The latter are now existing in the herbarium of the society at Chiswick. Of the genus Pinus he discovered several species of gigantic size, one of which has been named after himself, *P. Douglasii.* In the spring of 1827 he went from Fort Vancouver across the Rocky Mountains to Hudson's Bay, where he met Captain (now Sir John) Franklin, Dr. Richardson, and Captain (now Sir George) Back, returning from their second overland arctic expedition. With these travellers he returned to England, bringing with him the results of his researches. Shortly after his return he was elected, free of expense, fellow of the Linnæan, Zoological, and Geological Societies. He remained in London two years, and sailed again for the Columbia River in 1829. He afterwards went to the Sandwich Islands, where he had remained some months when an accident put an end to his existence. The natives of the Sandwich Islands are in the habit of making pits, in which they catch the wild bulls. In one of his excursions Mr. Douglas fell accidentally into one of these pits, in which an infuriated animal was already trapped. The animal fell upon him, and he was found dreadfully mutilated and quite dead. This occurred on the 12th of July, 1834.

Of modern botanical travellers, Douglas was one of the most enterprising and successful. Almost all the new hardy plants of our gardens were introduced by him. To him we are not only indebted for many valuable timber trees, for numerous species of the beautiful genus Ribes, and other ornamental shrubs; but the favourites of every garden—the Clarkias, Penstemons, Œnotheras, and Lupines, were almost all first collected by him. A list of all the plants collected by him would occupy too much space, but an idea of the value of his labours may be formed by the following enumeration of the number of species commonly growing in our gardens, which are the result of his various voyages:—

Of Ranunculaceae	Four species
Berberaceae	Two species
Rhamnaceae	One species
Papaveraceae	Three species
Cruciferae	One species
Violaceae	One species
Silenaceae	One species
Alsinaceae	One species
Linaceae	One species
Malvaceae	Two species
Aceraceae	Two species
Geraniaceae	One species
Leguminosae	Thirty-three species
Limnanthaceae	One species
Rosaceae	Twenty species
Onagraceae	Fifteen species
Loasaceae	One species
Portulacaceae	One species
Grossulaceae	Fourteen species
Saxifragaceae	Two species
Umbelliferae	One species
Cornaceae	One species
Caprifoliaceae	Four species
Valerianaceae	One species
Compositae	Eleven species
Lobeliaceae	Two species
Ericaceae	Four species
Polemoniaceae	Fifteen species
Hydrophyllaceae	Eight species
Solanaceae	One species

Scrophulariaceae	Twenty-seven species
Labiatae	Two species
Primulaceae	One species
Verbenaceae	One species
Nyctaginaceae	One species
Polygonaceae	One species
Garryaceae	One species
Coniferae	Eight species
Iridaceae	Two species
Hemerocallidaceae	Two species
Asphodelaceae	Four species
Liliaceae	Eleven species
Melanthaceae	One species.

Of these, 53 are woody plants and 145 herbaceous plants. His dried collection of Californian plants alone consists of about 800 species, but these were only a part of his extensive herbarium.

(*Gardener's Magazine*, vols. xi. and xii.; *Companion to the Botanical Magazine.*)

DOUMA THEBA'ICA. [Doom, P. C.]

DRABA, a genus of plants belonging to the natural order Cruciferæ, the suborder Latiseptæ, and the tribe Alyssineæ. It has an oval or oblong pouch, slightly convex, the seeds many in each cell, not margined, in two rows, the filaments simple. The species are perennial or annual branched herbs, with linear oblong or ovate leaves, yellow or white flowers.

D. verna, common Whitlow Grass, has a leafless scape, glabrous above, with lanceolate acute attenuated leaves, hairy below, the petals deeply cloven, the pouch oblong, shorter than its pedicel. It is an exceedingly common plant, ornamenting old walls and dry banks in the spring, before other flowers make their appearance. It is found throughout Europe, and is most abundant in Great Britain. It is the *Erophila verna* of De Candolle.

D. aizoon, Evergreen Whitlow Grass, has naked smooth scapes, linear acute keeled stiff ciliated leaves, the style as broad as the hairy pod, but one-half shorter. It is a native of Bavaria, Austria, Hungary, Transylvania, and the Carpathian mountains, particularly on Mount Chocsz.

D. aizoides has a leafless glabrous scape, with linear, rigid, acute, keeled, glabrous, ciliated leaves, the stamens as long as the slightly notched petals, the style elongated. It is a native of gravelly soils in almost every country of Europe. It is a rare plant in Great Britain, and has been found on rocks and walls at Pennard Castle, near Swansea. The other British species are *D. rupestris*, a rare plant found on mountains in Scotland; *D. incana*, also a mountainous species, and *D. muralis*, found on the shady sides of rocks, walls, and mountains, but it is a rare plant in Great Britain.

Above sixty species of Draba have been described. They are all insignificant plants, inhabiting the temperate and colder parts of the world. They are not often cultivated, but are adapted for rock-work. They are apt to drop off in winter when exposed, and the best way to preserve them is to keep them in pots as other alpine plants. They grow best in a mixture of sand, loam, and peat, and the pots should be well drained with potsherd. They may be propagated by dividing the roots or by seeds.

(Babington, *Manual*; Don, *Gardener's Dictionary*.)

DRACONTIUM (from δράκων, a snake, because the stem is mottled like the skin of a serpent), a genus of plants belonging to the natural order Araceæ. It has a cymbiform spathe, with a cylindrical spadix, quite covered with hermaphrodite flowers, the perianth 7-9-parted; 7-9-stamens, with oblong 2-celled anthers, opening obliquely by a pore at the apex, and distinct from their filaments; the ovary 2-3-celled, each cell containing one pendulous ovule; a 1-3-seeded berry; seeds without albumen.

D. polyphyllum has a tuber resembling a small cake, producing one or two leaves, with long clouded spotted petioles, resembling the skin of a snake. The spathe is large, of a purple colour, very deep inside, hooded, acute, and appearing after the leaves have withered. It smells so powerfully on first expanding, that persons have been known to faint from the stench. It is also said to excite the nerves of hearing, and even induce a state of catalepsy. It is a native of Guiana, Surinam, and other parts of equinoctial America, where it is called Labarri, and regarded as a remedy against the bite of the Labarri snake, which its spotted leaf-stalks resemble in colour. Its use in this respect is doubtful, but its powerful action on the system might render it available in the treatment of many diseases. There is a species of Dracontium in India, called by Ainslie by the same name, which is remedy in asthma, and is used in hæmorrhoids.

The *Dracontium fœtidum* of Linnæus, the Skun Skunk Cabbage of the United States, is now refer genus *Symplocarpus*. It differs from Dracont ovaries being 1-celled, and in its spathe being cu emits a powerful odour. When the tubers are powdered they are used as an antispasmodic in A has been recommended in asthma and chronic bro in certain cases of hysteria, dropsy, and epilepsy.

(Lindley, *Flora Medica.*)

DRAIN TRAPS [Sewers, P. C., p. 319; P. C. S., p. 208], contrivances to prevent the foul air from drains, but to allow the passage of them.

They often fail to produce the intended effect, expense is often incurred in attempting to apply a the wrong place. 'The drains smell, we shall hav common expression, but perhaps few inquire why forth their peculiar intimation of a change in the atmosphere. It has become the practice to trap they leave the house in order to prevent the from the sewer, so that a large quantity of air i the drain between these large traps and the smaller sinks in the house. Now this air being liable from various causes (among which are the diminu pressure of the atmosphere indicated by the falling cury in the barometer, and also the introduction of occasionally displaces the very small column of w sink-traps, and escapes into the house, to the serious of the inmates. The remedy is, to insert one end into the highest part of the drain so that the foul escape at the other extremity of the pipe where it duce no inconvenience.

DRAINAGE. [Sewers, P. C.]

DRAMATIC LITERARY PROPERTY. RIGHT, P. C. S.]

DRAWER. [Bill of Exchange, P. C.]

DREBBEL, CORNELIUS VAN, was born at A in Holland, in 1572. He is chiefly distinguished the inventor of the thermometer; or, at least, by that honour with Santorio. His instrument, which have been first used in Germany in 1621, consisted of glass containing water and connected with a bel ing air: by the expansion and contraction of the a sequence of the variations of temperature, the c water was allowed to rise or fall in the tube; and height of the column, being measured by a scale, se indication of the temperature.

Drebbel also discovered the means of producing scarlet dye for woollens and silks; and, according mann, he communicated the discovery to Kuffler, Leyden, who had married his daughter. The p afterwards introduced into France by the persons blished the Gobelines manufacture, the objects of w celebrated for the brilliancy of their scarlets. It asserted that he was the inventor of the telescope a scope; but this is probably without foundation, may have made some improvements on those instru

The reputation which Drebbel acquired during less due to his useful discoveries than to a preten ledge of the causes of many natural phenomena; fe in an age of ignorance respecting physical science, to impugn his claim to such knowledge. Th Rudolph II. granted him a pension, and Ferdinan him the tutor of his son; but a revolution takin Austria, he was imprisoned in that country, and, interference of the king of England, James I., he been executed. Drebbel spent the rest of his l country; and it is said that, on his arrival, he prese king a glass globe which exhibited the phenomena o thunder, and rain, with the sun and planets in per tion; he is also said to have contrived a boat whic rowed under the surface of water, and in whic might read without artificial light. He died in Lon year 1634.

Drebbel wrote, in Dutch, two works which wards translated into Latin and French: one of t the Nature of the Elements, the Winds, Rain, the other, on the Quintessence, with the manner of it from minerals, vegetables, &c.

DREDGING-MACHINES are machines em deepening and clearing away deposited matter from

rivers, canals, harbours, and basins; dredging
m applied to such operations in common with the
nilar one of fishing for oysters. [Pectinidæ,
.]

hines employed for this purpose may be com-
ughs, harrows, or great shovels, used only to
t or deposit, preparatory to its removal either by
the retiring tide or by artificial scouring or
hers not only detach the sand or silt from the
lso bring it above the surface of the water and
nto a vessel in which it may be removed to be
s ballast; or, when it is not wanted for this pur-
h it may be carried to some place where it may
to deep water without doing any mischief. Boats
the latter purpose are frequently made with one
funnel-shaped openings in the bottom, through
contents may be discharged by simply releasing a
door.

simplest contrivances for performing this opera-
own as the spoon dredging-machine, which con-
ng ring or hoop of wrought-iron, partially edged
out two feet or rather more in diameter, attached
a pole thirty or forty feet long, and carrying a
ullock's hide perforated with a number of small
apparatus is connected by ropes and tackle with
hter, from the side of which it is let down and
such a manner that the steel edge of the hoop
soft bottom, and scoops a large quantity of silt
which is then drawn up to the surface. The
up with the silt runs through the holes in the
when sufficiently elevated, is swung over the
ned so as to discharge its contents. The pole
made of two pieces, capable of sliding upon one
dapt the machine to various depths. By this
ich is commonly worked by from two to four
ntity of stuff raised in a tide from a depth of
a half to three fathoms, may, with a tolerably
ttom, range from twenty to sixty tons.

dredging-machine is adapted for performing the
a much more extensive scale, and with the aid of
wer. It was, indeed, originally worked by men,
worked by the power of horses walking in a cir-
the boat, but neither of these plans is eligible,
the steam-engine to work it, the advantages of
machine are questionable. The distinguishing
s machine is a long massive framework with a
end, over which a series of endless chains, or a
by two or more chains laid side by side, is placed
esembling the apparatus of Dr. Spurgin, described
ls, P. C., p. 313; so that by turning one of the
hole chain is set in motion. Attached to the
ies of iron buckets, edged with steel, and perfo-
merous small holes. This framework, with its
ets, is attached by one end to supports elevated
sel, while the other end, which is suspended by
kle, dips obliquely into the water. In some
ket-frame is mounted outside, but parallel with,
which it is attached; but a better arrangement
e hinder part of the vessel by an opening in the
el, sufficiently capacious to allow the working of
ame within it. By means of the tackle attached
nd the bucket-frame is let down until it reaches
when, the steam-engine being set to work, the
ets begins to perform its circuit, by which every
succession, made to scoop up a quantity of silt,
ies up to the top of the oblique frame, the water
through the holes in the bucket as it proceeds.
the wheel at the upper end of the frame the
es an inverted position, and consequently pours
ts into a barge which is brought under the stern
to receive it, after which it descends on the
the frame to be refilled. In the new edition of
pædia Britannica' is a long article upon 'Dredg-
ed by very detailed engravings and descriptions
am dredging-machine, in which the peculiarities
e construction of steam-engines for such use are
lained.

, PIERRE, the name of two very distinguished
avers, father and son. The father was born at
4, and was the pupil of Germain Audran; and,
but for his son, who surpassed him, would have
t portrait-engraver of his own or any previous
ed at Paris in 1739, aged seventy-five.

Pierre Drevet, the son, was born at Paris in 1697, and was a complete master in his art already in his thirteenth year, when he executed a plate of the Resurrection of Christ, after J. Audré, which, in correctness of drawing and delicacy of execution, is equal to the works of any of his contemporaries. In his twenty-sixth year he produced his masterpiece, the full-length portrait of Bossuet, after Rigaud, in which every object in the picture is executed with such truth and delicacy, that the substance and material of each is easily and clearly distinguished—flesh, draperies, wood, the various ornaments—all have a peculiar and characteristic style of execution. He executed several other portraits of nearly equal merit. His style, in the opinion of some, was less adapted for history than for portrait, as being extremely laboured; it drew the attention from the subject as a whole to the parts, and destroyed the unity of effect. Some of his last works are executed in a freer style. He engraved exclusively after French masters, but his works are not numerous. He died at Paris in the same year as his father, 1739.

(Watelet, *Dictionnaire des Arts*, &c.; Huber, *Manuel des Amateurs*, &c.)

DRIFT. [Detritus, P. C.; Diluvial Formation, P. C. S.]

DRILL. To what is given on the subject of drills under Boring Instruments, P. C. S., p. 225, we may add a reference to a contrivance styled a universal drill-stock, invented by Mr. Morgan Evans, and described in the 'Transactions' of the Society of Arts, vol. liii. part i. pp. 85-87, which offers peculiar facilities for boring holes in confined situations, where neither a brace nor any ordinary drill-stock could be applied; the necessary pressure being applied through the medium of a screw abutting upon any fixed point which can be found or temporarily applied over the hole, while the rotatory motion is given, in cases where a bow cannot be used, by a fixed lever-handle, with a ratchet and click to provide for its retrogression between each cutting stroke.

DRONERO. [Saluzzo, P. C.]

DRO'SERA (from δρόσος, dew), a genus of plants belonging to the natural order Droseraceæ. It has a calyx deeply 5-cleft; 5 petals; 5 stamens; 3-5 styles, deeply bifid; a many-seeded 1-celled capsule, with 3-5 valves. The species are herbs inhabiting bogs and mossy swamps. The leaves are furnished with reddish glandular hairs, which discharge from their point a viscid acrid fluid. Insects are often caught upon these hairs, and hence they have been supposed to be irritable, and to resemble those of the *Dionæa muscipula* or Venus's Fly-trap, a plant belonging to the same order.

D. rotundifolia, common or round-leaved Sun-dew, has orbicular spreading leaves, hairy petioles, erect peduncles, seeds with a loose chaffy coat. This plant is a native of Europe, in boggy places especially, where the Sphagnum grows. It is employed in Italy for making the liqueur called *Rossoli*. It is an acrid and caustic plant, and has been supposed to cause rot in sheep. It curdles milk, and has a reputation for removing corns, bunions, and warts. When distilled with wine a stimulating spirit is procured which was formerly much used as an excitant.

Two other species, ***D. longifolia*** and ***D. anglica***, are natives of Great Britain. The first is a common bog-plant, but the latter is only common in the British Islands in Ireland. About forty species of this genus have been described. They have been found in boggy places in all parts of the world, except in the extremes of heat and cold. They are all singularly beautiful, and worthy of cultivation. They thrive best in small pots, which should be three-parts filled with peat earth, and sphagnum should be planted on it; the Droseras should be planted in the moss, and the pots placed in pans of water. The New Holland and Cape of Good Hope species will require the stove. They may be propagated by seeds, but foreign plants should be brought over in cases, for which purpose those of Mr. Ward are admirably adapted.

(Don, *Gardener's Dictionary*; Loudon, *Encyclopædia of Plants.*)

DRUMMOND, CAPTAIN THOMAS, was born at Edinburgh, in October, 1797, the second of three sons. His father died whilst he was an infant; his mother removed to Musselburgh, where she resided many years, devoting herself entirely to the education of her children. Drummond throughout life expressed in the warmest manner his obligations to his mother, and attributed much of his success in after-life to her intelligence and vigilance. He was early entered at the High School of Edinburgh, and there formed an acquaintance with Professors Playfair, Leslie, and Brewster, and also with Professors Wallace and Jardine, whose pupil he more especially was.

In February, 1813, he was appointed to a cadetship at Woolwich. His mathematical abilities soon made him conspicuous, and he was moved from the sixth to the fifth academy without the usual examination, and passed with such rapidity through that academy, and the fourth and third, that at Christmas of the year in which he joined he entered the second academy.

Much of his success was doubtless to be attributed to the admirable preliminary education he had received, but much also to a character of determined perseverance, and to the vigorous and well-regulated mind he brought to bear on all subjects. To this it was probably due that he never became exclusively a mathematician, but advanced equally in all the various branches of study, being at that time, as he continued through life, distinguished for general knowledge and for aptitude to seize on information of every kind. His mathematical character at Woolwich has been thus well and justly sketched by his friend and master, Professor Barlow:—'Mr. Drummond by his amiable disposition soon gained the esteem of the masters under whom he was instructed; with the mathematical masters in particular his reputation stood very high, not so much for the rapidity of his conception as for his steady perseverance, and for the original and independent views he took of the different subjects that were placed before him. There were among his fellow-students some who comprehended an investigation quicker than Drummond, but there was no one who ultimately understood all the bearings of it so well. While a cadet in a junior academy, not being satisfied with a rather difficult demonstration in the conic sections, he supplied one himself on an entirely original principle, which at the time was published in Leybourne's 'Mathematical Repository,' and was subsequently taken to replace that given in Dr. Hutton's 'Course of Mathematics,' to which he had objected. This apparently trifling event gave an increased stimulus to his exertions, and may perhaps be considered the foundation-stone of his future scientific fame. After leaving the academy he still continued his intercourse with his mathematical masters, with whom he formed a friendship which only terminated in his much lamented death.'

During his preliminary and practical instruction in the special duties of the Engineer Department, his talent for mechanical combinations became conspicuous, one of which is thus described by his contemporary and friend, Captain Dawson, to whose information this notice is largely indebted:—'The various inventions to supersede the use of the old pontoon led Drummond himself to consider the subject, and he made a model, like a man-of-war's gig or galley, sharp at both ends, and cut transversely into sections for facility of transport, as well as to prevent it from sinking if injured in any one part: each section was perfect in itself, and they admitted of being bolted together, the partitions falling under the thwarts or seats. The dockyard-men to whom he showed it said it would row better than any boat except a gig, and it was light, and capable of being transported from place to place on horseback.'

This early period of his career was also largely devoted to the acquisition of military knowledge, partly from the associations around him, and partly from the circumstances of the times. Jomini and Bousmard were his favourite authors, and often has the morning light surprised him in deep discussion on the details of Waterloo and the strategy of the recent campaigns.

At Chatham, the practical and varied applications of scientific knowledge brought by Colonel (now General) Pasley to the aid of military science, offered the highest attractions to a mind like Drummond's. During the period of his service at Chatham, his military fervour led him to obtain leave of absence for the purpose of visiting the army of occupation in France, and attending one of the great reviews.

Before he joined at Chatham he had served a short time at Plymouth, and after his Chatham course was completed he was stationed at Edinburgh. The duties there offered nothing to engage his attention, relating merely to the charge and repairs of public works; but he was happy in being again thrown among his family and friends, and more in the opportunity again afforded him of pursuing the higher studies in which he delighted, at the college and classes, and among the scientific society of his native city. He found the duties however so trivial, and the prospects of the service so disheartening, that for some time he meditated lea
for the bar, and had actually entered his nam
Inn with this view.

But in the autumm of 1819 he fortunatel
quainted with Colonel Colby, when that office
through Edinburgh on his return from the t
operations in the Scottish Highlands. Th
which these duties afforded of combining sci
with the military service induced him to ab
tention of forsaking the corps, and in the cou
lowing year an offer from Colonel Colby to tak
trigonometrical survey was gladly accepted.
the advantage of a residence during each wint
and, with a definite object in view, again devoted
more closely than ever, to the study of the hig
of mathematics.

During this period he also devoted consider
to the study of chemistry, and attended the le
fessors Brande and Faraday. The society of
Prout, it is believed, first led his mind to th
with his usual felicity of application, he soon
knowledge available to the duties he was
The incandescence of lime having been spok
of the lectures, the idea struck him that it
ployed to advantage as a substitute for argand
reflectors used on the survey for rendering
stations; because, in addition to greater intensi
the advantage of concentrating the light as near
into the focal point of the parabolic mirror,
whole light would be available for reflecting
of parallel rays, whereas of the argand lamp
portion of rays near the focus was so reflected.
ject his first chemical experiments were forme
Dawson recollects Drummond mentioning the
turning from the lecture, and that on the way
a blowpipe, charcoal, &c. That evening he
resolved that he would thenceforth devote
the hour or two before his evening studies
'how much Dr. Prout had done during the inte
professional occupations.'

At this period (1824) a committee of the H
mons recommended that the survey of Irela
begun, and that Colonel Colby should make
for carrying it on. The objects of this surv
work very different from the survey in Engl
himself and a small number of officers, every
be formed by Colonel Colby for the work.
improved construction were required. Amo
means of rendering visible distant stations was de
recent experience of the Western Islands had
bability that in a climate so misty as Ireland th
distant observations would be greatly increased,
Colby at once saw the important results which
such an improvement of the lamp as that which
had devised. Under his judicious advice the exp
prosecuted, and were rapidly attended with succe
gress and results are detailed by the author in the '
Transactions' for 1826, as well as the first appl
lamp to actual use in Ireland. When a station, S
in Donegal, had long in vain been looked fo
Mountain, near Belfast, the distance being
passing across the haze of Lough Neagh, Mr
took the lamp and a small party to Slieve Snaugh
culation succeeded so well in directing the a
flector to the instrument, that the light was see
appearance will long be remembered by those
it. The night was dark and cloudless, the mou
camp were covered with snow, and a cold wi
duty of observing no enviable task. The light
hibited at a given hour, and to guide the observ
lamps formerly used, an argand in a lighthouse
placed on the tower of Randalstown church, wh
to be nearly in the line at 15 miles. The time ap
passed, and the observer had quitted the telesco
sentry cried, 'The light!' and the light inde
view, a steady blaze of surpassing splendour, whic
effaced the much nearer guiding beacon.

An apparatus invented by Colonel Colby,
flat plates of polished tin, at angles calculated
sun's rays in the required direction was resorted
entire success. It was however somewhat elabor
from the rapid motion of the sun, or rather of the
orbit, the same pole and set of plates would only

tion, and for a short time on a very few days; the however was now obvious, and the elements which called into play soon suggested the more perfect t. From a calculation, of which the variables were ive position of two stations and that of the sun, a p led to an instrument by which the problem should were solved by construction—a telescope in the line the objects, connected with one to be directed on the carrying a mirror; such accordingly was the first of Drummond; its mechanism is described in the eady referred to ('Phil. Trans.' 1826), and, like the was used successfully in the first season of the trigo- al operations in Ireland. It was originally intended to instrument a divided circle, by which its direction e fixed; but as this was not effected, a theodolite was y in conjunction with it, and practice soon showed a theodolite were used, a more simple and less costly at might be adopted. This accordingly was devised r. Drummond before the second season; the direction ected entirely by the theodolite, instead of being, as ; dependent partly on the theodolite and partly on the ents of the heliostat. The telescope of the heliostat ame useless, and it remained a simple mirror move- two directions, *i. e.* on a horizontal and on a vertical hich the light was guided by a directing staff pre- placed by aid of the theodolite. This instrument satisfactory that it has ever since remained in the pted on the survey, and it is every season found more useful. By its aid several observations have e at distances exceeding one hundred miles; and, facility of direction—owing also, no doubt, in some the great divergence which even the best mirrors eflected light—that the theodolite is now frequently with, and by a few simple distances and measure- mputed beforehand, a single soldier is sent with a to some remote mountain or island, with tolerable that his reflection will be seen as soon as the sun ter he reaches it. [DRUMMOND'S LIGHT, P. C. S.]

rummond's original heliostat was not completed till heliostat had also been invented by Professor Gauss, gen, in the process of a survey carried on by him in . A very simple one had also been used by the mmander Mudge, of the Royal Navy, while surveying oast of Africa in 1823-4, which consisted merely of a ent forward to the station to be observed, and so as to throw the sun's light to the observer.

the autumn of 1824 Colonel Colby made a general issance of Ireland for the purpose of fixing on the mode ey, the choice of stations for the great triangulation, most fitting place for a base. He selected Mr. Drum- accompany him on this tour. The Plain of Magilli- chosen, and Col. Colby's attention was next directed ng apparatus for the measurement.

el Colby's long experience had shown him the defects pparatus formerly employed, and he boldly devised gether new, in which compensating expansions were sed to form an unalterable linear measure. The tion of the instruments required long and careful ents, the charge of which was confided to Mr. Drum- and so far as was necessary to prepare the instruments n the field, they were performed by him or under his . It occurred to him that mica, which had then been recommended by Sir David Brewster for pen- ds, might be applicable to this new purpose. Colonel llowed experiments to be tried on that substance, but re not satisfactory, and Mr. Drummond abandoned . The apparatus was completed according to Colonel original plan, and successfully used in the base at an. In the measurement Mr. Drummond was again d, and whenever Col. Colby was absent on other charge of the operations devolved on him.

is period of invention and improvement which pre- he commencement of the survey of Ireland, Mr. nd gave some consideration to the barometer, an nt even now susceptible of improvement, but which then received so much attention as it has since. ourite construction was the siphon, and he made h his own hands, which performed remarkably well; was not in possession of various modes of reading have since been used: some of which, especially point, as now applied with a moveable scale by , leave nothing to be desired, at least for the lower d he devised a singular mode of bisecting a reflected image of the surface, a ghost, as he called it; but he arrived at no permanent or practical result, and at length abandoned the subject from a conviction, to use his own words, that the errors to which the barometer was liable from causes beyond control, were greater than the quantities he had been dealing with. His researches on light, and his intimacy with Professor Leslie, led him to the use of the photometer, the æthroscope, and other philosophical instruments of more or less practical utility; among others, Wollaston's thermobarometer; indeed, at this period so active was his mind and so constant his application, that scarcely an instrument existed that he did not examine and consider, with a view to render it useful for the purposes of the survey; and the elaborate collection with which the meteorological observatory on Divis was furnished, presented a singular spectacle on the mountain-top. He carefully made observations and recorded them, till a calamitous storm destroyed the observatory and all its contents together.

A severe illness which Mr. Drummond contracted from exposure during the Irish survey compelled him to return to Edinburgh, where he was unable to devote himself to study, but he had taken much pains to perfect his light, and he now began to revert to the idea that he had early formed of adapting it to lighthouses. In this he was liberally met by the corporation of Trinity-House, and to it he devoted much of his time during the following winters: the experiments he made, with their success, are detailed in the 'Philosophical Transactions' for 1830.

The Corporation of Trinity-House placed at his disposal a small lighthouse at Purfleet; and the brilliant effect of the light as seen from Blackwall, where, at a distance of ten miles, it was sufficiently strong to cast shadows, made it an object of very general interest.

Here perhaps it may be proper to notice the erroneous ground on which Mr. Drummond has received credit for the lime light. He has by some been called the inventor or discoverer of this, and when it is found to have been known before, he is by others accused of piracy. He never claimed the chemical discovery; it has been stated to have grown out of a lecture on the very subject, and it is known that the solar microscope had been exhibited several years before at the London Institution, and probably at other places, by the light of lime burnt under the mixed gases. Mr. Drummond's merit was in rendering practically useful a recondite experiment,—by devising a means of procuring and using without danger agents so turbulent as the mixed gases, making the apparatus sufficiently portable and simple to be employed in the circumstances of exposure required for the survey, and, perhaps more than all, for the happy idea of using this minute spherule of concentrated light as the radiating focus of a parabolic mirror.

But the original object of the lamp, its application to lighthouses, presents difficulties which have yet to be overcome. The abstraction of Mr. Drummond's attention at the moment when he was nearest to success, must, so far as the light is concerned, be considered matter of regret; with its projector it has dropped, but if it be practicable, ingenuity will doubtless sooner or later be directed to render it available, and the Drummond light may yet cheer the home-bound mariner from the Skellig or the Tuskar.

Mr. Drummond lived on terms of intimacy with Mr. Bellenden Ker who was employed in the preparation of the details relating to the Reform Bill, and by him was mentioned to Lord Brougham, then the Lord Chancellor, as a person eminently qualified to superintend the very laborious operations necessary to the perfecting the schedules and laying down the boundaries to the old and the new boroughs. Lord Brougham was previously well acquainted with his talents and attainments. Mr. Drummond, on the recommendation of Lord Brougham, was appointed to this commission, not however without some severe opposition from one of his colleagues, who doubted much as to the propriety of putting at the head of so important a department a young lieutenant of the Engineers. He however more than justified the expectation formed by his patron.

We shall not enter into any detail of his labours; it is sufficient to state that whatever he did met with the most complete approbation of the ministers of the day.

When the Reform Bill was passed, Mr. Drummond returned to his duties on the survey, and he had made preparation for giving an account of the base before adverted to, when he was again called into public life by being appointed Lord Spencer's private secretary. On the dissolution of the government, he received a pension of 300*l.* a year, obtained for him by Lord Brougham, his constant friend.

In 1835 he was made under-secretary for Ireland; he much distinguished himself in the report on railways in Ireland, being at the head of the Commission. We shall not attempt to trace his labours as a politician or on the railway commission, but his talents and assiduity were admitted by all, even his strongest political opponents. He laboured incessantly at his duties, and probably hastened his death by his continued application. This took place April 15, 1840, 'in the plenitude of mental power and maturity of knowledge, beloved in private and esteemed in public.' No better estimation of his character can be given as an upright and virtuous man, when it is stated that Lord Spencer wrote to the person who states this, that it was 'one of the most pleasing recollections of his political life that it had made him acquainted with Drummond.' And whilst this article was passing through the press, Lord John Russell, in the House of Commons, adverting to a celebrated remark of Mr. Drummond's when in Ireland, that property had its duties as well as rights, said he was proud to name him as his ever-to-be-lamented friend. Soon after his death there was a subscription for a statue, which has been executed at Rome, to be placed in Dublin.

(See *Mem. in Papers connected with Duties of the Royal Engineers*, vol. iv.—MSS.)

DRUMMOND'S LIGHT. The difficulty of distinguishing the stations chosen for the angular points of the triangles in a geodetical survey, when those stations are many miles asunder, renders it necessary to have recourse to illuminations even in the day-time; and the late Captain Drummond, of the Royal Engineers, invented a heliostat which reflected the sun's rays in sufficient abundance to render the station which was to be observed visible.

This was a plane mirror of a rectangular form and mounted on a stand with joints by which it could be fixed at any angle with the horizon. On the stand was a telescope which was capable of being moved horizontally, with the mirror, and directed to the distant station, while another telescope was directed to the sun. The adjustments of the mirror were such that, when the telescopes were directed, as has been said, the face of the mirror reflected the rays of the sun on the distant station, and illumined it sufficiently to render a mark there visible in the telescope of the theodolite by which the required angle was to be taken.

When it was required to observe the angles subtended between distant stations at night, the white or blue lights were first employed in this country; the materials being fixed, at the station, at times agreed upon by the parties employed in performing the operations: Argand lamps, with parabolic reflectors, were used by the French, and subsequently by the English geodists; but a light which Captain Drummond obtained has been found to exceed in brilliancy any of the others. This is produced by placing a ball or disk of lime, about a quarter of an inch in diameter, in the focus of a parabolic mirror, at the station to be rendered visible, and directing upon it, through a flame arising from alcohol, a stream of oxygen gas. (*Philosophical Transactions*, 1826, p. 324.)

The cistern containing the alcohol is supported on a stand, behind the reflector, and is connected by a tube of caoutchouc with the lower part of a hollow stem supporting the upright wire at the top of which is fixed the ball of lime on a level nearly with the cistern: the spirit ascends in the stem, and afterwards, through three or more tubes, to the ball. The vessel containing the oxygen gas is connected, by a flexible tube, with an orifice in a cylindrical box on the same stem, from whence it ascends through three flexible caoutchouc tubes to the ball, after passing with friction through three small cylinders. The whole apparatus is attached to a stand which carries the mirror; and adjustments are provided by which the ball may be placed exactly in the focus of the mirror. The intensity of the flame is from sixty to ninety times as great as that of an argand burner, while the expense

pass through two or three pieces of wire ga
two streams against the ball or disk of lime. T
latter from wasting too rapidly in one place it
volve once in a minute; and in order to keep
light, it is proposed to have an apparatus by w
of balls may be successively made to fall in th
mirror.

A light of this kind may also be employed
determining the difference between the longitu

DRYAS, a genus of plants belonging to th
Rosaceæ, and to the tribe Dryadeæ. It has
cleft, in one row; 8-9 petals; numerous stam
composed of numerous small nuts, tipped with
hairy styles, which are straight at the extremi
gated on a dry receptacle; the seed ascending.
are herbs or under-shrubs, with the stipules
sides of the petioles.

D. octopetala has crenate-serrate obtuse lea
three or four times as long as broad, more or le
base of the calyx hemispherical. This plant ha
with a woody prostrate stem and simple leav
pubescence beneath. It is a native of Alpine
rope, and is found on the mountains of Scotla
and in Yorkshire in England.

D. depressa has crenate-serrate obtuse lea
twice as long as broad, and blunted and round
the base of the calyx truncate and nearly flat.
has only been found at Ben Bulben, in Sligo,
recently described by Babington in the 'Ann
History.' There are three other species descri
tive of Greenland, and two natives of North A
are all evergreen prostrate plants. When c
thrive best in a border of peat soil. They
gated by dividing the roots, or by seeds. The
planted in pots as other Alpine plants.

(Babington, *Manual of British Botany*; D
Dictionary.)

DRYOPS, the name given by Olivier to a g
tamerous coleopterous insects of the family C
type is the *Dermestes auriculatus* of Geoffroy, a
grey sluggish beetle, not uncommon in Europe
bourhood of watery places. Fabricius changed
this genus into *Parnus*. It includes fourtee
which seven are American and seven Europea
Dryops was applied by Fabricius to another ge
tera, of which the *Œdemera femoralis*, a Swi
the type. Changes of this kind are highly o
creasing as they do the confusion arising from
synonymy.

DUAREN, or DUARE'NUS FRANÇOI
lawyer, was born about the year 1509. His you
devoted to literature; and he is said to have
rudiments of his professional education from co
M. Budé, Maître des Requêtes at Paris, to w
he was employed as tutor. He afterwards
Bourges, where in his old age, as defender of t
system of jurisprudential instruction, he carri
controversy with Cujacius, then in his youth.
of a kind so frequently exhibited when a rising
old settled principles, was conducted with so m
between the factions, headed by these two lead
compared to a civil war. Cujacius acknowledg
exertions he had to make in this controversy
of his subsequent legal knowledge and critical

Duaren died at Bourges in 1559. His wo
lished at Leyden, in 1584, in two volumes fol
are subsequent editions. Some of his minor
lished in the 'Tractatus Tractatuum.' There
him in Taisand's *Les Vies des plus célèbres Ju*

DUCCIO DI BUONINSEGNA, a
painter of Siena, and one of the earliest of the
ers, was born in or near Siena, in the latte

as the most extensive production of its class in its cost, including gold and ultramarine, about 3000 n immense sum. Duccio's portion, however, was ugh probably enough: it was only sixteen pence or day; but at this time ten soldi would buy a picture. ure was on a pannel made of poplar and chesnut, over with canvas which was primed with plaster. rried in procession to the cathedral, and placed on altar with great ceremony. As the altar was free es, Duccio painted the altarpieces on both sides: on ipal side, or that facing the people, are represented figures the Madonna and child, surrounded by saints ls and the four patrons of Siena; on the other side ies of small pictures illustrating the history of the f Christ, in figures about six inches high, all executed eat skill and surprising care, but in the Byzantine style ge. It was removed from the altar in the early part of teenth century to give place to a tabernacle, and was ards cut in two, and the halves were placed in the there they still remain.

are other works by Duccio extant; but Rumohr has Vasari's statement respecting him and the pavement athedral of Siena to be incorrect. The first mention vement in the archives is in 1445, more than a cen- r the death of Duccio. Vasari's account of him is r worthless. Vasari states that he was the artist of the decorations of the pavement, and was the inventor culiar style in which the figures are executed, which gray in gray. But these figures are in various styles: a species of niello, and others in a kind of mosaic; were executed at different periods by various artists, apparently subsequently to 1445. (See Rumohr, *Researches*, vol. ii., p. 4, et seq.) Titius, vicar- f Siena, and Duccio's contemporary, says of him, any painters proceeded from his studio as the warriors d descended out of the Trojan horse. The year of his not known; Della Valle supposes he died about 1340; places his death upwards of twenty years earlier.

Rumohr, *Italienische Forschungen*; Vasari, *Vite de'* &c., ed Schorn; Della Valle, *Lettere Sanesi*, ii. 75, ni, *Storia Pittorica*, &c.)

HANGE, GASPARD, an able French etcher and r, was born at Paris in 1662, and died there at the age of ninety-four. He was the pupil of Jean , and was one of the best historical and portrait en- of his period. He was, according to Watelet, the all engravers in representing female flesh. Three of celebrated works were the Io, Danaë, and Leda of gio, of which he afterwards destroyed the plates on of their indelicacy. He engraved until his ninety- r, and his works are considerably numerous.

elet, *Dictionnaire des Arts, &c.*; Huber, *Manuel des* *s, &c.*)

LEY LIMESTONE, an equivalent term for the k limestone of the Silurian system.

RESNOY. [Fresnoy, Du, P. C.]

CAMA'RA. [Solanum Dulcamara, P. C.]

ONCEAU, PETER S., LL.D., was born in the Rhé, in France, probably between 1750 and 1760. e had finished his studies in his native province, he Paris, apparently with no other prospects than those rary adventurer; and there he made the acquaintance of the men of letters of the time, among others of Gebelin, the author of the celebrated work entitled nde Primitif,' &c., who took him into employment as tary. In this situation he was found, in the year 1777, aron de Steuben, in passing through Paris on his way k for America, whither he was proceeding to take he insurrection of the English provinces that had just ut. The German volunteer proposed to the young an to accompany him in the double quality of secre- aide-de-camp, and, Duponceau having accepted the ey set out together. He served four campaigns in erican army; and after the peace in 1783, he was d by the American government to a place in the office ecretary of State for Foreign Affairs. In this line of ent he remained till about the beginning of the century, when, in the hope, we are told, of acquiring ndependent position, he betook himself to the study of and in due time commenced practice. But after some retired from the bar, and devoted himself to literary es. These particulars we learn from a notice prefixed to eau's 'Mémoire sur le Système Grammatical des Langues de quelques Nations Indiennes de l'Amérique du Nord,' by M. J. B. B. Eyriès, under whose care the work was printed, in 8vo., at Paris, in 1838. This Mémoire, to which a prize founded by Count Volney had been adjudged by the Institute of France in 1835, contains an account and examination of the languages of what the author denominates the Algonquin races, or the tribes calling themselves the Chippeways or Ojibbeways. These form, according to Duponceau, one group of the Indian tongues of North America, as those of the Iroquois, the Sioux, the Esquimaux, and the aborigines of Florida, severally form other groups or families. Their great divisions are into the Chippeway, the Lenni-Lénâpé, and the Mohegan. Duponceau's examination is very elaborate, and appears to be acute and sensible; his work extends to nearly 400 pp., without including a long preface running to above 70 more. The author, upon his success in gaining the Volney prize, was made a correspondent of the Institute; and he was also a member of several other European literary societies, as well as president of the American Philosophical Society (in which office, previously held by Franklin, Rittenhouse, and Jefferson, he succeeded Chief Justice Tilghman, in 1828), and of the Society of History and of the Athenæum of Philadelphia. M. Eyriès adds that Duponceau had translated from the German MS. the Lenni-Lénâpé Grammar of Zeisberger, and the Swedish work of Campanius on the district of North America formerly called New Sweden, now forming part of the state of Pennsylvania. If these works have been published, we have not met with them. The only other works of Duponceau that we have seen are the following:—'A Dissertation on the Nature and Extent of the Jurisdiction of the Courts of the United States,' 8vo., Philadelphia, 1834; 'A Brief View of the Constitution of the United States,' 8vo., Philadelphia, 1834; and 'A Dissertation on the Nature and Character of the Chinese System of Writing,' 8vo., Philadelphia, 1838. The two legal tracts are discourses of little pretension, addressed to the students of the Law Academy of Philadelphia, of which Duponceau was for many years provost: the object of the philosophical disquisition, of which there is a copy in the British Museum, presented by the author, is to refute the common notion that the Chinese written characters do not in any sense represent words, but only ideas, and the inference thence deduced, that they may be read and made use of by other nations who do not understand the Chinese spoken language—as for instance by the Japanese and Coreans. Duponceau shows this to be impossible, as well from the nature of language generally as from the true nature of the Chinese writing, which, although neither alphabetic nor syllabic, he explains to be still lexicographic, or strictly representative of particular vocables with their grammatical accidents (differing in every two languages), and not merely pictorial or vaguely indicative of ideas or things, like the writing (improperly so called) of the Mexicans, a system adapted only to the rudest and most limited purposes. This able man, whose works are all, as far as we have examined them, marked by careful research and sound information, as well as by just and independent thinking, died at Philadelphia, on the 2nd of April, 1844.

DUPUYTREN, GUILLAUME, Le Baron, was born at Pierre-Buffière, a little village of the department of Haute-Vienne, in France, on the 5th of October, 1777, or 1778. His parents were poor, and at the age of three years he was stolen from them by a lady of rank, who wished to adopt him as her son. He was however returned to his parents, and received his early education at the college of Magnac-Laval. During one of the college vacations, whilst he was playing in his native village when a troop of cavalry passed through, one of the officers was much struck with the appearance of young Dupuytren, and being pleased with his answers to his questions, obtained his own and his parents' consent to take him with him to Paris, and to educate him. The officer had a brother in the Collége de la Marche, under whose care Dupuytren was placed. Here he had a brilliant career, and determined on pursuing medicine as a profession. He commenced the study of pharmacy under Lagrange and Vauquelin, and also attended the dissecting room. He is described at this time as occupying a room with a fellow student, the furniture of which consisted of three chairs, a table, a sort of bed on which the friends alternately reposed, and their means were so scanty that they were obliged to live on bread and water. During this period he always commenced his work at four o'clock in the morning.

In the month Frimaire of the year three of the Republic of France (the end of 1794) a new school of medicine was formed in Paris under Fourcroy. The office of prosector as well as the chairs of the professors were given by concours; for one of these positions Dupuytren contended, and was placed first on the list. His emolument was barely sufficient to keep him in health. During his need he was visited by Saint Simon, who, after stating to him his views of society, would have presented him with two hundred francs to relieve his necessities, but Dupuytren refused it. In 1801 he contended with M. Dumeril for the position of chef des travaux anatomiques, which he lost by one vote; but a few months after, Dumeril having been appointed to a professorship, the place was given to Dupuytren.

Up to this time morbid anatomy had only been pursued in the same manner as descriptive anatomy. Little had been done towards regarding the appearances of bodies after death as the result of certain definite actions in life; and the facts recorded by Bartholin, Bonet, Manget, Morgagni, and Lieutaud, had never been systematised, nor any general principles deduced from them. Dupuytren saw this, and devoted himself with ardour to pathological anatomy. He however determined to connect this branch of inquiry with surgery. The results of his labour were not however published by himself, as indeed very little that he has done has ever been, but appeared in a work by M. Marandel, entitled ‘Essai sur les Irritations,’ Paris, 1807. In this work the organic lesions of the body are distributed into species, genera, orders, and classes; and although the work contains many errors of observation, and much hasty generalization, it must be regarded as a successful effort toward forming a science of morbid anatomy.

In 1803 Dupuytren took his degree in the faculty of medicine. On this occasion he wrote a thesis on some points of anatomy, physiology, chemistry, and pathological anatomy. This thesis contained important statements of facts and deductions. The principal subjects were, the structure of the various canals of the bones, the use of the lateral ligaments, the nature of the chyle, and on the nature of the morbid formations called false membranes. It was published in Paris in 1804. The same year a society was also constituted in the faculty of medicine for the purpose of discussing and publishing papers on medical subjects. From 1804 to 1821 this society published seven volumes, under the title ‘Bulletin de la Faculté de Médecine de Paris, et de la Société établie dans son sein,’ 8vo. The bulletins were drawn up by Merat and Dumeril, and contain a great number of reports and memoirs which had been communicated to the society by Dupuytren. Among the most important were papers on the influence of organic lesions on health; a description of several monstrous fœtuses; description of two children, one a dwarf, the other a giant; and on the cause of death in drains and *fosses d'aisance*. The result of his researches on this last subject led to important alterations in the construction of drains, &c., so as to secure a more perfect ventilation, and thus the frequent occurrence of death amongst the workmen has been prevented. In his researches on this subject he was assisted by Thénard the chemist, who was his intimate friend. Thénard also assisted him at this time in some researches upon the nature of diabetes mellitus. Although the surgeon and the chemist arrived at no satisfactory conclusions with regard to this disease, they observed and recorded many important facts. The result of their investigations was published in the ‘Bulletin’ for 1806.

The same year, 1803, a vacancy having occurred in the office of assistant-surgeon at the Hôtel Dieu, Dupuytren was a candidate. This office was given to Dupuytren after examination by public concours. In 1811 Sabatier died, who had long filled the chair of surgery with the highest reputation. The concours for this office took place in 1812, when Dupuytren, Roux, Tartra, and Marjolin were the candidates. The examination consisted of written replies to certain surgical and anatomical questions, a defence by each of the candidates of his own particular positions, operations upon the dead body, and a thesis. Dupuytren was successful. The subject of the thesis was the operation of lithotomy. That presented by Dupuytren was published in Paris, with the title ‘De la Lithotomie; Thèse présentée au Concours pour la Chaire de Médecine opératoire,’ 4to. In 1815 he was transferred to the chair of clinical surgery, which he held till his death. In 1818 he was advanced to the post of senior surgeon to the Hôtel Dieu.

Although it would be difficult to point out a single department of surgery or morbid anatomy on which the views, opinions, and observations of Dupuytren are not known, yet he
has left no record of these in works written
During the twenty years, however, that he held
professor of clinical surgery at the Hôtel Dieu,
were published in the various French medical pe
many courses have been also published in the En
periodicals. A collection of them has also been
Paris by a society of young medical men, un
‘Leçons Orales de Clinique Chirurgicale, faites à
de Paris, par M. le Baron Dupuytren, recueillis
par une Société de Médecins,’ 1832, 8vo. T
tended to four volumes, and embraces the views
on most of the important points of surgery.
morbid anatomy have been fully given by Roch
in their great work on medico-chirurgical path
‘Nouveaux Elémens de Pathologie Médico-
5 vols. 8vo., Paris, 1833. In the ‘Répertoire
of Breschet and Royer-Collard, and the ‘Médecin
de Sabatier’ of Sanson and Beguin, the surgical
logical views of Dupuytren have found faithful re

The improvements introduced by Dupuytren
ment of surgical diseases were always founded
anatomical and pathological knowledge, and
owes much of its success to his exertions.
which he turned his attention was artificial anus,
posed an operation in this painful state which
fectly successful. On this subject he presented
from his own hand to the Académie Royale de
It was published under the title ‘Mémoire sur
Nouvelle pour traiter les Anus accidentels.’ Be
the papers before referred to, the following subjec
he wrote are amongst those which have disting
both as a pathologist and surgeon:—on the N
Tongue; on the Motions of the Brain; on the
Absorption; on the Influence of the Eighth Pair
on Amputation of the lower Jaw-bone; on the
Arteries; on Fracture of the Fibula; on Conge
cations; on Retraction of the Fingers.

In the department of practical surgery he wa
successful; he possessed almost entire control
ings; and, with great anatomical knowledge,
perception, and perfect steadiness of manipulation
tions were regarded as the most successful of the
of the Parisian hospitals. His presence of mind
him; and the difficulties and accidents which
occur in operative surgery were always made
the instruction and guidance of the pupils.
career as an operative surgeon he invented many
Amongst these is the enterotome, with which
for artificial anus is performed, and which has
victims from the grave. Other instruments of
are—a double-bladed bistoury, for the bilateral
stone in the bladder; a cataract-needle; a compr
of hæmorrhage; a *porte-ligature*, and others.

His performance of his duties, as surgeon and cl
was remarkable. Although he had one of the
practices in Europe, and accumulated through
largest fortune ever made by a medical man, he
his public duties. He spent from four to fiv
morning in visiting his patients at the Hôtel Die
operations, making post-mortem examinations,
instruction, and in consultations. Every evenin
to the hospital at six, for the purpose of visiti
cases and performing urgent operations. These
he never intermitted, even during sickness, and
ing from attacks of disease. These labours, ho
told upon even his iron constitution, and in Nov
he first gave symptoms of decay. On the fifth
he was seized with a slight attack of apoplexy,
only a short time, but left behind it a difficulty
as well as an inclination of the mouth towards
He still continued his duties at the Hôtel D
friends at last persuaded him to make a journ
He remained in that city till May, 1834. He
visits and lectures at the hospital, and struggle
bruary, 1835. He died on the 8th of the same
retained his intellectual faculties to the last, and
approaching end, wished that the medical pa
read to him the evening before he died, ‘in ord
served, ‘that he might carry the latest news of
the world.’ He however repudiated the sugge
was a sceptic in religion, and received, previous
the last sacrament of the Roman Catholic Churc

In his will he left the bulk of his enormous for

0l., to an only daughter. He also left 200,000 e purpose of endowing a chair of pathological his sum being found larger than was necessary rely the chair, a certain portion of the income ropriated to maintaining, in connection with the um of pathological anatomy, which is called the ytren. He left his body, to be carefully ex- is two friends MM. Broussais and Cruveilhier, d a minute account of the post-mortem examina- s buried in the cemetery of Père la Chaise, on February. The funeral was attended by all the the faculty, and deputations from the Academy and the Institute, and the funeral car was drawn rom the church to the tomb. Orations were de- grave by MM. Orfila, Larrey, Bouillaud, Royer-Tessier.

Dupuytren will ever be remembered as a clever t operative surgeon, it is not on this that his sts. It was the scientific character that he gave instruction that placed him far above those who him, and which led to the cultivation of surgery les founded on physiological and pathological her than on rules founded on the practice and revious writers. If he has left no great works udge of the value of his labours, he has yet raised enlightened practitioners of surgery in France, numerous writings have ever been anxious to Dupuytren as their master.

admired and venerated as a surgeon, Dupuytren ved as a man. Early in life he met with one of intments which, however common in society, e impressions on susceptible minds. In the gaieties of Paris, and mixing in all its society, he erfect anchorite, and few, if any, were permitted heart. He regarded all with suspicion and mis- ver allowed the opinions of others to influence nduct. He was susceptible to the slightest in- er forgot an affront. He required of others the de and excellence which he himself possessed, ar of no excuse for the non-fulfilment of duty. es induced fear and respect in the minds of most was surrounded, but in others hatred. He thus riends and bitter enemies; and it is to be feared ity of his enemies was in some measure the cause gement from society, and that cynical character he most conspicuous failings of this great man.

l. i., 1834-5; *Eloge du Baron G. Dupuytren*, et; *Revue Médicale*, 1835; Callisen, *Medici- iftsteller Lexicon*.)

D, **JEAN NICOLAS LOUIS**, author of ks on architecture, and Professor of Architec- Ecole Polytechnique, was born at Paris, Sep- 760. His father was a shoemaker in such very tances that there was no other prospect for the t of being obliged to follow either the same or manual employment. It was, however, young d fortune to be rescued from such lot by the rposition of a benevolent individual, who, having by the boy's natural cleverness, offered to defray of his education. He was, accordingly, placed e Montaigne, but quitted it much sooner than was ing to the strictness of the discipline there, and incurred some severe punishment. Yet, not- his disgust with the school, he had profited by n which he had received, and had imbibed a ssical studies which he continued to cultivate. ence of his being thus thrown again upon his have been very serious, had not a sculptor who eral sketches and drawings by him proposed to en about the age of fourteen) as his pupil. Still his natural taste for drawing, it was of a kind to apply with more relish to the architectural f sculpture than to the human figure. While his nd voluntary studies were all given to architec- gress in those which he was professedly pursuing ver the expectation of his instructor. To his ad confided—if not his repugnance for sculpture, ger inclination for the other art; which being d to his first benefactor, he again exerted himself his former protégé, and recommended him to architect (author of 'Elémens d'Architecture,'). Under him, his advance was exceedingly ithin the course of about two years he became draftsman to Boulée, the King's architect, at a salary of fifty pounds sterling, which enabled him to support his mother, who had just before been left a widow in almost destitute circumstances. This connection with Boulée proved most fortunate, for besides his other practice Boulée had frequent commissions for designs from foreign courts, which gave Durand not only a wider field of practical study, but opportunities of suggesting to his principal many ideas of his own. Nor did his assiduity and ability fail to be duly appreciated by Boulée, who several times offered to raise his salary, and as he had invariably refused to accept any advance, afterwards settled an annuity upon him, which he received till his death. While with Boulée, he also attended some of the courses of instruction at the Académie Royale d'Architecture, where he joined the competitions, and in 1780 obtained the great prize, the subject being a design for a college adapted to a site whose shape was an equilateral triangle. About a dozen years later, the demand on the part of the National Convention (1793) for designs for public edifices of utility or embellishment, proposed to be erected in various parts of France, afforded Durand and Thibaud (who had become strongly attached to each other while both were with Boulée) an opportunity of displaying their talents upon a variety of subjects. They produced conjointly eleven different designs, to each of which was appended the following motto or device: 'next to the happiness of being useful to one's country, is the happiness of living unknown,'—a sentiment not a little singular, as coming from those who are supposed to be impelled to generous exertion by the hope of honourable distinction for their names,—a sentiment however which seems to be acted upon by the generality of architects, who of all artists are the least anxious to identify their own names with their works. Of those eleven designs four obtained the great prize, and are published in Detournelle's collection of 'Les Grands Prix.' After this, though the friendship between Durand and Thibaud continued unabated, they ceased to practise in concert with each other. In fact Durand practised scarcely at all during the latter and greater portion of his life, for on being appointed to the professorship at the Ecole Polytechnique, which he held for forty years, he gave himself up almost entirely to its duties, and to the self-imposed task of providing works of instruction for the pupils, and also the profession in general. Of these the most celebrated as a 'show-book,' is the 'Recueil et Parallèle des Edifices de tous Genres,' 1800, consisting of eighty-six plates of oblong or double folio size, and forming a sort of historical gallery or museum of architecture. Yet though interesting as facilitating a general view of the subject, and affording a comparison of different buildings drawn to the same scale, its real usefulness is by no means so great as it at first seems. Notwithstanding the size of the volume, which is such as to render reference to it very inconvenient, there are so many different subjects upon the same plate that they are necessarily upon a very inadequate scale, and some of them so small, that they might have been larger even on a duodecimo page. In other respects, too, they are far from being shown satisfactorily, there being seldom more than a mere general plan and elevation of each; besides which the collection is little other than a compilation of all the most celebrated, consequently the most generally known buildings. Thus, without being sufficiently popular in form and subject for the mass of the public, the work is too general in its nature for professional study except as a synopsis of the subject, and a sort of catalogue raisonné. The new edition now in the course of publication will be improved by the addition of several new plates, but they consist for the most part of subjects taken and reduced from other works—from Schinkel, Klenze, and other architects, but, rather strange to say, there is not among them all a single example from any living or recent English architect. The 'Recueil' itself contains no text, but Legrand's 'Essai sur l'Histoire Générale de l'Architecture' was published as an accompaniment to it in a separate octavo volume. Durand's other work, the 'Précis des Leçons d'Architecture,' 2 tom. 4to., is generally considered a valuable one of its kind, yet has been objected to as seeking to establish formal mechanical rules that are rather derogatory from true art. Accordingly, though greatly commended by some, his '*interaxal* system' of laying out a plan by first dividing the whole of it into a number of squares, determined by the intercolumniation adopted for the order, if there be one, has been scouted by some as a dull and plodding process, calculated only to produce wearisome monotony of arrangement, and to cramp instead of stimulating imagination. There is another publication by Durand entitled 'Partie Graphique des

Cours d'Architecture,' &c., 4to., Paris, 1821. He died at Thiais, in the neighbourhood of Paris, December 31st, 1834.

DURAND, NICOLAS. We notice this other French architect of the same name, because he is said by Nagler to have been the father of the preceding, although he does not state that circumstance while speaking of him whom he supposes to have been the son of Nicolas. But as all other accounts agree in making *Jean* the son of a shoemaker, there can be little doubt of Nagler's having fallen into a mistake; which being the case, we hardly know how to trust his account of *Nicolas* in other respects. If it be correct he must have lived to a very great age, for though born (at Paris) in 1738, he was still living in 1824 at Châlons-sur-Marne, but whether that was just before his death is not said. He was considered one of the best architects of his time, and built the Hôtel de la Préfecture (1758), and the Porte Dauphine (1769) at Châlons; and at Langres the Hôtel de Ville (1772), the Hôtel Dieu (1774), and the Dominican Convent, which last is commended by Wiebeking as one of the best buildings of that period in France.

DURHAM, JOHN GEORGE LAMBTON, EARL OF, was born at the family seat of Lambton Hall, or, as it has been latterly called, Lambton Castle, in the bishopric of Durham, on the 12th of April, 1792. His father was William Henry Lambton, Esq.; his mother, the Lady Anne Barbara Frances Villiers, second daughter of George Bussey, fourth earl of Jersey. The family is said to have possessed its manor of Lambton ever since the twelfth century, the male succession never having been interrupted since that remote date. The property was originally of inconsiderable value; the wealth of the family, arising principally from coal-mines, dates from the time of Major-General John Lambton, the late Lord Durham's grandfather, who succeeded to the estate in 1774, and died, at the age of eighty-four, in 1794. He was a fourth son (his three elder brothers having all died unmarried); and so was his father Ralph Lambton, Esq. The Lambtons however had held an eminent place among the county gentry from the beginning of the last century; and either the head or some other member of the family represented the city of Durham in parliament from 1727 till the death of the late earl's father, at the age of thirty-three, 30th December, 1797, after he had sat in the House of Commons for about ten years. Mr. William Henry Lambton, who was, like his ancestors, a decided Whig, was an intimate friend and associate of Charles Fox, and the other leaders or chief members of his party; and he was also highly popular with his constituents.

The subject of the present notice, whose mother was remarried in 1801 to the Honourable Charles William Wyndham, third son of Charles, second earl of Egremont, and survived till 1832, was educated at Eton. On the 1st of January, 1812, he was married at Gretna Green to Miss Harriet Cholmondeley, described in the 'Annual Register' as 'daughter of the late celebrated Madam St. Alban;' and about the same time he is stated to have entered the 10th Hussars. By Miss Cholmondeley, who died 11th July, 1815, he had three daughters, who all died before himself, though not till after they had all attained the age of womanhood. On the 9th of December, 1816, he married the Lady Louisa Elizabeth Grey, eldest daughter of Earl Grey.

Meanwhile, on the vacancy occasioned by the death of Sir Henry Vane Tempest, Bart., on the 1st of August, 1813, Mr. Lambton had been returned to parliament for his native county. He very soon took a part in the proceedings of the House, his maiden speech having been delivered on the 12th of May, 1814, in seconding an unsuccessful motion of Mr. C. W. Wynne for an address to the Prince Regent against the annexation of Norway to Sweden. He continued to sit for the county of Durham so long as he remained a commoner, and, though he did not speak often, to make a considerable figure in the debates; especially distinguishing himself in 1815 by moving for the production of papers relative to the transfer of Genoa to Sardinia, and by opposing the new Corn Law Bill; in 1816, by bringing forward the subject of Mr. Canning's mission to Lisbon, and by opposing the addition made to the incomes of the royal dukes, and the continuance of the Alien and Bank Restriction Acts; in 1818, by opposing the Indemnity Bill demanded by ministers; in 1819, by his opposition to the six repressive bills brought in by the government after the great Reform meeting at Manchester; and in 1821, by his reprobation of the late proceedings against the queen, and by a plan of parliamentary reform which he submitted to the House on the
17th of April, and which, after a languid dis
nights, was rejected by a majority of 55 votes to
self being, by an accident, not present at the d
leading parts of this scheme were, that the rep
the counties and universities should remain the s
but that for cities and boroughs should be substit
districts of 25,000 inhabitants each; that electio
extend beyond six days; and that the duration
should be limited to three years. The subject
ary reform occupied a principal share in Mr. La
tion from this time, but his views underwent
tion in the course of the next ten years.

His exertions in the House of Commons
began to relax under the pressure of ill health;
is scarcely connected with any measure of cons
to the great and eventually successful renewal
agitation in 1830. With the generality of his
ported both the Canning ministry of May, 18
Lord Goderich, by which it was succeeded,
the same year; and on the dissolution of the
uary, 1828, he was raised to the peerage
Baron Durham of the City of Durham. It
king insisted it should be of the city, and not
We find the date of Lord Durham's patent vari
17th and the 29th of January, 1828.

On the formation of the ministry of Lord Grey,
ber, 1830, Lord Durham was made Lord Priv
the preparation of the government Reform Bil
to four persons, of whom he was one, the others
John Russell, Sir James Graham, and Lord Du
is known that Lord Durham proposed the introd
ballot into the scheme, and persuaded his colleag
with him; but the ballot was excluded from
actually drawn up and brought forward in the
Lord John Russell on the memorable 1st of
A speech which Lord Durham delivered
March, in the House of Lords, in explanatio
sure, was published. The plan reported by the
was also materially improved by making 10*l*.,
the qualification. He took no part in the dis
second Reform Bill in the House of Lords, whe
feated on the second reading, on the 3rd of O
eldest son, a beautiful boy, whose features will
in the well known picture by Lawrence, had
sumption, at the age of thirteen, on the 24th
ber. He spoke several times however in suppor
and last bill, which was discussed in the Lords
May, 1832, and especially made a very able sp
mittee on the 22nd of May, 'on the enfranchis
metropolitan districts,' which was published.
third daughter by his first marriage, on the 1
1832, at the age of seventeen; and his second
January, 1833, at that of nineteen. On the 1
in the latter year he resigned his office in the
and three days after was made Earl of Durham.
of Durham had hitherto been considered as
office of the Bishop of Durham as Count Pala
never, at any rate, been otherwise bestowed. Bu
after this (in 1836) the bishop's palatine jurisdic
lished by the 6 & 7 Will. IV. c. 19.

In the summer of 1833 Lord Durham was dis
special mission to Russia, with the object of
emperor to soften the severity of the proceeding
unhappy persons who had been engaged in th
insurrection; but it was not attended with any su
is well known that he was never able even to
word Poland to the emperor. From the time of
England, after a few months' absence, he may be
having more distinctly joined the section of the
which advocated still further reforms in the r
and as having thus gone to a certain extent into
the existing government. The difference of vie
arisen between his lordship and his former colleag
claimed somewhat explosively at the great dinn
Lord Grey at Edinburgh, on the 15th of Septe
and he followed up this beginning by a successi
exhibitions in various parts of the country during t
of the year. A collection of his speeches upon th
was afterwards published. In 1835 however he
from that noisy scene by being a second time
Russia, as ambassador at the court of St. Pete
he retained that post till the summer of 1837, an
self, it is said, extremely acceptable to the em

daughter died, at the age of twenty-three, in Decem- 35, three months after her marriage to the Honourable eorge Brabazon Ponsonby, eldest son of Viscount non.

Durham's last political undertaking was perhaps his portant—the pacification of the troubles and dissen- Canada, to which country he was sent out as High sioner and Governor-General, with extraordinary in 1838. He arrived at Quebec on the 27th of May; sunderstanding or difference of views soon arose be- im and the ministry at home; and, conceiving that he supported as he ought to be, without having been ecalled or having obtained leave to return, he re- d from the same port on the 1st of November follow- is arrival in London on the 7th of December was y followed by the publication of a report addressed to n, dated 'London, 31st January, 1839,' of great al interest, detailing the history of his colonial admi- n, vindicating his conduct, and explaining the prin- n which he had proceeded, and on which he conceived management of the affairs of Canada ought to be d. But his unprecedented step of leaving his govern- thout permission occasioned a rebuke, and he was not to land under the usual salute. He in consequence wife resign her household place.

ate of his health now no longer permitted him to part in public affairs, at least beyond attending occa- n the House of Lords. At last, early in the summer he retired, with no hope of recovery, to the Isle of and he died at Cowes, on the 28th of July. A son, nt Earl, and three daughters, one of whom is since vived him. Lady Durham died at Genoa, in her year, on the 26th of November, 1842.

Durham retained his popularity as a public man to a ble extent to the last, though it was impaired by his pologising for the Russian emperor at meetings, and etter to a Durham voter against out-and-out Re- He was much beloved by his private friends, and a remarkable power of gaining the good-will and gard even of persons with whom he came casually tact, or with whom he had only a comparatively tercourse. With a good deal of ostentation and teur of demeanour when he presented himself to blic eye, his manners in private life are said to en simple and winning; his temper was not good, wing to the irritation of bodily disease; but his was kind and generous; and nobody doubted his ncerity in the political opinions of which he was cate, not excepting those of them which seemed rast most strongly with some of his personal habits al tastes and dispositions, nor even those others which sometimes charged with being readier to preach act upon. It was believed that at the moment at always thought as he spoke. But in truth most of nsistency and tergiversation attributed to him was to ather to the account of the excited imaginations of his and followers, who interpreted his words by their es and wishes. As a politician however, his most ble quality was certainly rather boldness than pru- and his boldness was more impulsive, or the produce temperament, than founded upon deep consideration ady resolute strength of character. As a statesman, e concluded from his whole career that he was much rgely endowed with the talent of overlooking than of overcoming difficulties.

Mag. for September, 1840; *Peerages and other* ; *Parliamentary Debates*; *Annual Register*; *Lord 's printed Speeches*, &c.)

RENBERG, the celebrated salt-mine, is in a moun- the duchy of Salzburg, a league from Hallein, 1067 ve the city: it yields annually 300,000 cwt. of salt. e has been worked ever since the year 1123, and gives ent to a great number of men.

are also salt-works at Dürrenberg, in the Prussian Saxony, three leagues from Merseburg. The mine enberg was first opened in 1763, and the estate of erg belonging to it, was purchased in 1760 by Xavier, who at that time had the administration of torate of Saxony. The works are very exten- e buildings being 6000 feet in length, with admi- achinery, a steam-engine, &c. These works being in that part of the kingdom of Saxony which was ceded to Prussia by the treaty of Vienna, May 18, 1815, a convention was concluded with Prussia in 1819, and renewed in 1828, by which 170,000 cwt. of salt are to be annually delivered to Saxony at a certain fixed price. Müller says, that the works yield annually 6000 lasts of salt, weighing 4000 lbs. each, besides a considerable quantity of salt for manure.

(Brockhaus, *Conversations Lexicon*; Stein, *Geographisches Lexicon*; Hörschelmann; Müller, *Wörterbuch des Preussischen Staates.*)

DUTY. [Right, P. C.]

DYER, GEORGE, was born in London, March 15, 1755. He was educated at Christ's Hospital, where, when his standing in the school gained him access to the library, he acquired that taste for extensive reading which produced the works which will preserve his name: he was at the school from the age of seven to nineteen. While at school he was much noticed by Dr. Askew, physician to the hospital, at whose table he was a frequent guest, in company with much of the distinguished part of the literary world. It is worth note that this singular specimen of a simple mind and want of knowledge of the world around him had very early opportunities of seeing mixed society. In 1774 he entered at Emanuel College, Cambridge, and took the degree of B. A. in 1778. After being for a time usher at a free grammar school, and several others, he returned to Cambridge, not taking up his residence in college, but in the family of his friend Robinson, the dissenting minister, as tutor to his children and pupil of their father. He had by this time become a dissenter himself. Of the Life of Robert Robinson, which he afterwards wrote, Dr. Parr said that it was one of the best specimens of biography in the language. He officiated for some time at Oxford as a dissenting minister, of the Baptist persuasion; but after relinquishing this duty, and again residing for some time in Cambridge, he finally settled in London in 1792. From that time till 1830 his time was employed at first as a reporter in the House of Commons (which occupation he abandoned after two months' trial of it), afterwards as a private teacher, finally in various literary undertakings presently mentioned: at the last-named date his eyesight gradually failed, and at length he became totally blind. He died at his chambers in Clifford's Inn, March 2, 1841.

Dyer was a poet, a scholar, and an antiquarian, deeply versed in books and their history. As a poet he attracted notice, but not fame; contemporary histories of living authors call him a 'pleasing poet,' 'of considerable genius,' &c. phrases the meaning of which there is no mistaking. As a scholar he edited some plays of Euripides and an edition of the Greek Testament; but he is best known as editor, or joint editor, of Valpy's combination of the Delphin, Bipont, and Variorum editions of the Classics, in a hundred and forty-one volumes, in which all the original matter and *additamenta*, except the preface, were contributed by him. As an antiquarian, his principal works are—'History of the University and Colleges of Cambridge,' 2 vols. 8vo. London, 1814; 'Privileges of the University of Cambridge,' 2 vols. 8vo. London, 1824; the first volume containing the charters, statutes, &c., the second being a supplement to the history; and in connection with these, 'Academic Unity,' 8vo. London, 1827, being a translation with additions of the 'Dissertatio Generalis' in the second work. Dyer published many other works of less note (a list of which is in the postscript of the second volume of the 'Privileges,' &c., just mentioned), and was a large contributor to the magazines.

Dyer was a man of a remarkable simplicity of character, and not only remarkable, but remarked and recorded, and that in a singular manner. His friend Charles Lamb (so well known under the signature of Elia), and who, in the London Magazine for October, 1823, had called him 'the gall-less and single-minded Dyer,' seems to have been in want of matter for December, until he remembered that he had a friend on whose good-nature no amount of reliance was too great. Accordingly, in an article headed 'Amicus Redidivus,' he describes one G. D., with such allusions as made identification easy enough, as walking into the New River in a fit of absence, a thing which G. D. himself always denied with as much good faith as his chronicler could have wished. Some years before, in the same magazine this wicked Elia had made a supposed meeting with G. D. in a library at Oxford the substratum of another article, in which the simplicity of his friend was made the subject of many a good joke; such for instance as the following, which seems to have been that worst of all jokes, the true one: 'D. commenced life, after a course of hard study in the "house of pure Emanuel," as usher to a knavish fanatic schoolmaster at ——, at a salary of eight pounds per annum, with board and lodging. Of this poor stipend, he never received above half, in all the laborious years he served this man. He tells a pleasant anecdote, that when poverty, staring out at his ragged knees, has sometimes compelled him, against the modesty of his nature, to hint at arrears, Dr. —— would take no immediate notice; but, after supper, when the school was called together to evensong, he would never fail to introduce some instructive homily against riches, and the corruption of the heart occasioned through the desire of them, ending with "Lord, keep thy servants, above all things, from the heinous sin of avarice. Having food and raiment, let us therewith be content. Give me Agar's wish,"—and the like; which to the little auditory sounded like a doctrine full of Christian prudence and simplicity, but to poor D. was a receipt in full for that quarter's demands at least.' Mr. Dyer was as angry at these articles as it was in his nature to be; and took his revenge by informing the public, in a note to the postscript at the end of the 'Privileges,' &c., that the facetious Elia never was at Oxford. 'What, however,' he continues, 'he says of G. D. and his pursuits there is funny enough, when not too complimentary.'

The history of Cambridge is rather a sketch than a history; but it is the sketch of a man who had all the reading necessary for writing the history: and it may be added that the materials for the early annals of the university are very defective. Dyer has given a good account of his materials: it is to be wished that he had made more specific references to them in the body of the work. But it will be found, on examination, to be the work of a very honest man; for to this character he has a most unimpeachable title. That a bibliographer, whose whole life had been passed in libraries, and all whose enjoyments lay in antiquarian research, should never have acquired so much of the habit of minute description as to put the dates to his own list of his own works, will not surprise those who are acquainted with the early antiquaries. Nevertheless, the 'History of Cambridge' is a very important addition to what existed on the subject: and nothing but the opportunities of a Wood will surpass it.

It is said that Mr. Dyer left Memoirs of his own life, which, considering the extent of his acquaintance with the literary men of the commencement of this century, will probably, if ever they should be published, be a useful addition to the sources of biography.

DYNAM. In estimating the effect of mechanical labour, it is desirable to have some idea of a simple unit well fixed in the mind. All who have studied know how much advantage there is in referring every kind of pressure to weight, and measuring it by the weight which will balance it. Thus if one hundred pounds weight will bend a spring into a certain position, we have no difficulty in substituting an opposite force to the weight for the recoil of the spring at the point of application. It is equally convenient to arrive at a distinct notion of a unit of useful effect in the workmanship of machines; but it may not at first be so apparent that the thing is practicable. Nevertheless, the theory of dynamics contains the means of showing that all the effects of a given power are convertible in the following manner. Exclude friction and useless resistances, and suppose that a steam-engine, for instance, will exhaust a certain quantity of fuel in raising a ton through a hundred feet, no power being thrown away. Suppose also that the same machine, with the same fuel, will completely expend the power of that fuel in drawing a certain iron cylinder into wire of a thousand times its length. Then, if a machine could be constructed which acts by the descent of a weight, and draws wire without any loss of power, the descent of a ton through a hundred feet would just be sufficient moving power to draw out the cylinder just mentioned to a thousand times its length. We do not of course mean to say that such freedom from loss of power exists. If, for example, a certain quantity of fuel were made to raise water by a steam-engine, and the water so raised were allowed to fall upon a wheel and grind corn, it is certain that the water would not grind so much corn as the steam-engine itself directly applied to that purpose. But this arises from useless increase of resistances, and from badness of adaptation: it is impossible to make all the water in a fall produce its utmost effect upon a wheel. But what we say is, that were it possible to make adaptation perfect, there exists in the water raised exactly the same capability of grinding corn that there is in the fuel which raised the water.

This being the case, we may consider any
simply applied to raising a weight, and loo
weight raised as a dynamical synonyme for any
that the machine could have produced. And
further teaches us that the useful effect of any
power varies jointly as the weight raised, and
which it is raised. Thus twice as much power
pended to raise a double weight to the same
same weight to a double height. Accordingly,
of the number of pounds raised, and the numb
which it is raised, is a *relative* measure of the
power. For example, a certain expenditure of
70 pounds through 20 feet: what comparative
will raise 120 pounds through 210 feet?
70 × 20 or 1400 is to the product 120 × 21
in the proportion of 1 to 18; accordingly, the
requires 18 times the power of the first. Whe
done by 18 engines, or by an application of
much power to one engine, is merely a qu
tation.

We can convert the above relative me
absolute form by assuming as a unit one pound
one foot: let this be called a *dynam*, or
Thus in the first job above mentioned, there are
of work to do. Whether it be considered as 1
raised through one foot, or one pound through 1
100 pounds raised through 14 feet, &c. &c. matter
is 1400 times as much work as one pound raised
foot. Thus, what is commonly called a horse po
by our engineers to signify 550 dynams in a seco
engine which can raise one pound through 550
second is said to be of one-horse power.

This term was introduced by French writers,
the effect of a cubic metre of water raised throug
a *dynamie* or *dyname*. Dr. Whewell ('Mech
gineering,' Cambridge, 1841, 8vo. p. 150) prop
ralise the term dynam as applied to our most con
the pound and the foot.

It is for want of a distinct notion of this kin
persons fall into the error about force and its
lead them to contrive perpetual motions. But i
of this, there is great practical utility in havin
name for a quantity of work done, independentl
dental circumstances; for something which shou
proper expression for the result of a quantity of
generator of force without the necessity of desc
ticular mode of using the force. Watt was
who assumed, as a dynamic unit, the simple
pound raised one foot: but he did not venture
though the now common term, the *duty* of an
used by him, has reference to the number of
units as may be obtained from the engine. The
Gilbert, in his paper 'On the expediency of assig
names to all such functions of simple elements
definite physical properties' (Phil. Trans., 18
to represent the product of the pounds raised
through which they are raised by the term
he did not go further, and assign a name to th
ciency. This simple step, which is of more imp
propagation of clear ideas than many persons wi
be, is due to the French writers.

DYNA'METER. [DIVIDED EYE-GLASS
P. C. S.]

DYNAMO'METER. [SPRING-BALANCE,

DYTI'SCIDÆ, a tribe of pentamerous coleopt
founded on the genus *Dytiscus* of Linnæus. It
the following genera:—*Pælobius*, *Matus*, *Cop*
nectes, *Agabus*, *Ilybius*, *Colymbetes*, *Acilius*, *Hy*
tiscus, *Cybister*, *Copelatus*, *Anisomera*, *Laccophil*
Hydrocanthus, and *Suphis*.

The insects composing these genera are almost
flattened in form. They are very variable in size
very minute, others several inches in length.
posterior extremities are longer than the anteri
and ciliated. They are all aquatic insects, and
swimming, though at the same time capable of fl
the air with facility. They live in fresh water, an
great rapidity, chasing other water-insects, and
with their anterior feet. Although capable of ex
time under water, they are obliged to ascend at
the surface to breathe. This they effect by rem
when their bodies, specifically lighter than the

the surface obliquely, their heads downwards, so
emity of the abdomen, at which the stigmata of
re situated, is exposed to the air on reaching the
night they fly from one pool to another, and
en met with in places flooded by temporary rains.
' the Dytiscidæ leave the water and bury in the earth before changing into pupæ. Thus they are at first aquatic insects, next terrestrial, and in their final stage amphibious.

The typical genus Dytiscus has engaged the attention of Dr. Aubé, who enumerates ten European, one African, and six American species.

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E.

EAR-TRUMPET, an instrument employed to aid defective hearing, by collecting and concentrating the waves of sound, so that they may impinge upon the tympanum with increased force.

From what is stated under Speaking-Trumpet, P. C., p. 321, it will be seen that there is some difficulty in distinguishing, in early notices of acoustic instruments, such as were intended to be applied to the ear, to assist in collecting sound, from such as were employed in aid of the voice, to enable a speaker to produce articulate sounds in such a manner as to insure their transmission to a considerable distance. To a certain extent indeed such instruments may be employed for either purpose, some speaking-trumpets being so formed that, if applied to the ear, they would act as hearing or ear-trumpets. The experiment of Kircher, referred to in the above-mentioned article, appears to belong rather to the history of ear-trumpets than of speaking-trumpets.

The common ear-trumpet is a conical tube of metal, the larger end of which expands like the mouth of a trumpet, while the smaller is so shaped as to enter the ear, and conduct the vibrations of sound collected at the wide end direct to the tympanum. The smaller end is frequently curved, in order that it may be applied properly to the ear while the mouth is directed forwards to receive sounds from a speaker in front of the deaf person using it. For the sake of portability, ear-trumpets are frequently made in two, three, or more portions, sliding within one another, somewhat in the same manner as the tubes of an opera-glass.

Various other instruments are employed in aid of defective hearing, some of which are much more convenient, and others more powerful, than the ordinary ear-trumpet. Among those supplied at Dr. Scott's repository for acoustic instruments in the Strand, London, we may mention the *auricle*, a little scroll-like instrument, which may be compared to a shell, formed of gold, and worn in the ear, so that nothing but the expanded mouth is visible; *ear-cornets*, which are small instruments, made of various shapes and sizes, somewhat resembling a French horn or a musical trumpet in appearance, applied to the ears and held in their place by slender springs, which may be compared in their action to the sides of a spectacle-frame; *speaking* or *conversation tubes*, which are flexible elastic tubes of India-rubber and silk, kept open by spiral wire springs, and terminating at one end in what may be termed an ear-piece, and at the other in an open bell-shaped vessel which is held before the mouth of the speaker; and *table sonifers*, which are very powerful acoustic instruments, consisting of a revolving trumpet-shaped cowl, mounted on a pedestal, which may be placed upon a table, is capable of being turned towards any part of the room where conversation may be going on, and of communicating the sound through a flexible tube to the ear of the deaf person. When flexible tubes are employed for such a purpose, their effect is greatly increased by making them of a tapered or conical shape. One ingenious instrument of the ear-trumpet kind is made in the form of a walking-stick. Another, which is held so as to reflect sound into the ear, is styled the *ear conch*, and may be termed an auxiliary ear. It is formed of a kind of metal peculiarly sonorous, and plated. The commoner kind of acoustic instruments are made of tin-plate, japanned; but the better sorts are sometimes formed of silver, or of gong-metal, which is considered the best metal for the purpose.

Hebert (*Engineer's and Mechanic's Encyclopædia*, vol. i. p. 463) quotes an opinion from Dr. Morrison, of Aberdeen, that that end of an ear-trumpet which is applied to the ear should not be made so small as to enter the ear, but should be large enough to include the whole of the external ear. This opinion is said to be sanctioned by the experience of the gentleman referred to, who, having been deaf for many years, found no relief from ordinary ear-trumpets, but found one which he had made of block-tin, on the proposed plan, answer beyond his most sanguine hopes.

EARLE, JOHN, was born at York about the year 1601. Being sent to Oxford, and entered as a commoner at Christchurch College, he was afterwards, in 1620, admitted as a probationary fellow on the foundation of Merton College. He took the degree of Master of Arts in 1624, and that of Doctor in Divinity in 1642. About 1631, when he was
proctor, he was appointed chaplain to Philip earl
who was then chancellor of the university, and
berlain of the king's household. The earl pre
the rectory of Bishopstone in Wiltshire; and
influence probably he owed also his appointment
and tutor to Prince Charles, and chancellor of
of Salisbury. Of all these preferments he was
by the civil wars. After the battle of Wor
from England, and, meeting Charles II. at Ro
his chaplain and clerk of the closet. Earle re
during the whole exile of his master. Immedia
Restoration he was made dean of Westminster.
was consecrated bishop of Worcester, whence h
lated in the next year to the see of Salisbury. H
to attend much at court; and on the breaking
plague in 1665, he accompanied the king
Oxford, where, in University College, he died
November in that year. His tomb stands near the
of Merton College Chapel. Bishop Earle wa
cavalier and staunch high-churchman, but is repre
hands, by Baxter as well as others, as having h
moderate and kindly dispositions. He is now re
account of his work called 'Microcosmography,
the World discovered, in Essays and Characters,'
This volume was several times reprinted with ad
author's own lifetime, the eighth edition appear
The edition by Dr. Bliss, 1811, 12mo., is the
contains notices of the author's life and of his
with several small English poems of his, and spe
Latinity. Except these little pieces, and the
graphy, he published nothing but a Latin tran
Icon Basilike; 'Εἰκὼν Βασιλική, vel Imago Re
illis suis Ærumnis et Solitudine,' Hague, 1649.
mentions as his an unprinted Latin translation
'Ecclesiastical Polity,' which however has not
any one in modern times. Earle's 'Microcosmog
of the best, as it was one of the most popular,
sketches of character and manners which were
our literature for a century after the middle of Eli
and which, receiving the addition of narrative
transformed, in the beginning of the eighteenth
the little novels of the Spectator and other peri
The bishop's portraits, especially the ethical ones,
in shrewdness and in humour, and are very oft
with great terseness and epigrammatic point.

EARLOM, RICHARD, one of the most
English engravers of the eighteenth century, wa
early half of that century, and, according to Bry
living in 1816. A few foreign works speak more
the when and whereabouts of Earlom's birth, bu
the same time vague and contradictory; some sta
a native of Somersetshire, others that he was bo
about 1728. The dates of his works, which are
ous, range between 1760 and 1790. As a m
graver Earlom has never been equalled; his
other figure pieces in this line are excellent,
and flower pieces, after Van Os and Van Huysu
rivalled beauty and effect. Earlom also execute
ings and imitations of chalk drawings, the princi
is the celebrated 'Liber Veritatis,' published by
sisting of a series of fac-similes from the original
Claude Lorraine, in the possession of the Duke of
He engraved from a great variety of masters,
foreign, as Correggio, Ann. Carracci, Domenic
Guercino, Carlo Dolci, Luca Giordano, S. Canta
Matsys, Hemskerk, Teniers, Snyders, Ruben
Rembrandt, Vanderwerf, Velazquez, Mengs, Z
nolds, Loutherbourg, West, Wilson, Gainsb
Wright, Northcote, Romney, &c. &c.

Among his masterpieces are—the Royal Ac
Zoffany; Lord Heathfield, after Reynolds; an
Forge, after Wright. There is a list of his pr
in Bryan's 'Dictionary of Painters and Engraver

EASTER. The present year (1845) is
which are made remarkable by Easter Sunday be
direct defiance of the statement made in the act o
(24 Geo. II. cap. 23), by which it is 'the first

ll moon which happens upon or next after the 21st March: and if the full moon happens upon a Sunday, Day is the Sunday after.' The act which makes this ent also prescribes rules, that is, copies the rules of the ian calendar, and the tables constructed from them. ling to the rules and tables, Sunday, March 23rd, is Day of 1845. But the full moon is on this very day, 8 o'clock in the evening: so that by the explanation, Day ought to have fallen on the 30th. The error arises mistake and an omission in the act of Parliament: was never determined by the day of the 'full moon,' the '*fourteenth day* of the moon,' which words to have been written instead of 'full moon;' and er, the moon of the calendar is not the moon of the , but an imaginary moon in advance of it, contrived ons we shall presently mention.

shall in this article give as much of the history of and of the reformation of the calendar, as may ex- e discussions upon this subject: referring for fuller tion to an article 'on the Ecclesiastical Calendar' in panion to the Almanac for 1845: and to some supple- nformation in the same work for 1846. The last time ssion occurred was in 1818, at which period we can- tain that the true explanation was given by any one. next happens, the same misunderstandings will be , unless either the explanation given by the act of ent be altered in the mean time, or works of re- be made to contain an account free from the usual

isputes which agitated the Christians of the second respecting the observance of Easter depended upon stions: first, whether the feast was to be a version ssover, to be kept on the fourteenth day of the moon, iversary of the Resurrection, to be kept on the first the week; secondly, in what manner the full moon be predicted. The details of this dispute do not affect , except in one point. It seems clear that towards of the second century, the Metonic cycle of nineteen was frequently introduced into the reckoning. It is uliarity of this cycle of 19 years [PERIODS OF REVO- , P. C.; the explanation in METONIC CYCLE, P. C. ficient], that the new and full moons return to the same the month, generally speaking; that if, for instance, moon fall on the 10th of March in any year, it is most to fall on the same day in nineteen years, and certainly 9th or 11th, if not on the 10th. The astronomers, ll who predicted celestial phenomena for common use, this Metonic cycle; several modern writers on eccle- al history speak as if the Christians had invented the of the golden number, which is only the Metonic cycle s commencement altered. But it is material to notice ll countries unto which Greek civilization had found y, had their new and full moons predicted by this

e Nicene Council (A.D. 325) attempted to bring about eral usage in keeping Easter. What is left of this l is its creed, a synodical epistle, and twenty canons. her those canons which now exist are the genuine work Nicene Council is nothing to our present purpose, for o not mention Easter at all: nor should we have noticed here, had we not seen them cited by name in reference ter, to give, as it were, an impression that the council id down rules on the subject in a definite form. All nterference in the matter, as far as it can be collected he earliest historians of the council, Socrates and Theo- is contained in one sentence of the synodical epistle, ows—'We also send you the good news concerning the nous consent of all in reference to the celebration of the olemn feast of Easter, for this difference also has been up by the assistance of your prayers; so that all the en in the East, who formerly celebrated this festival same time as the Jews, will in future conform to mans and to us, and to all who have of old observed nner of celebrating Easter.' The case is clear enough: was a great schism between the Easterns and Westerns, e council simply decreed that the former should adopt ual practice of the latter. St. Ambrose, in the next tion, in a letter written A.D. 386, says that the council ot up the method of the cycle of nineteen years, they had named *Enneadecaëteris*. That is, Ambrose ot astronomer enough to know that both the thing he name had been current even in elementary works undreds of years before the council. In this, as we have mentioned, he has had followers; indeed, the necessity of accounting for the cycle of nineteen years in some way, and the want of knowledge of its astronomical history, has in a manner compelled theological writers to lay it at the door of the Nicene bishops, and thence to infer that they paid a very particular attention to the astronomical part of the settlement of Easter. But in fact their object was merely to keep the Eastern Christians from celebrating the Jewish passover; as long as this point was gained, they do not seem to have thought it necessary to interfere, even as regarded the East, with those differences of astronomical method, which they do not even mention, though they could not be ignorant that they existed in the West. And the result was as follows: from the time of the Nicene Council little or nothing more is heard about celebrating Easter on the fourteenth, instead of the Sunday after, while the disputes about the astronomical cycle of Easter recommenced almost immediately, and lasted for centuries.

Eusebius of Cæsarea, the historian, informs us in his life of Constantine that he had presented to that emperor a treatise on Easter, wherein the mystic character of that festival was explained; apparently a purely theological work. Jerome (*de Scriptor. Eccles.*) mends this statement, and informs us that Eusebius was the author of the cycle of nineteen years. Bede and others have copied Jerome, and Clavius (see the article cited at the beginning) brings forward Bede as more clearly explaining a statement of Ambrose to the same effect. Now Ambrose mentions no such thing; and meeting with the statement of Jerome since we wrote that article, we are inclined to suppose that Clavius meant to have quoted one of the contemporary saints, and wrote down a citation from the other, a supposition which would explain what must otherwise be called a disingenuous proceeding. Hence comes the current story that Eusebius and others were appointed by the council a committee to superintend the drawing up of the rule.

Shortly after the Nicene Council, there were disputes about the proper cycle for Easter. It is unnecessary here to note the various cycles which were proposed. It was not till the time of Pope Hilarius (A.D. 463) that the cycle of nineteen years obtained a permanent footing. This pontiff employed Victorinus of Aquitaine to correct the calendar, and Victorinus actually constructed the cycle of 532 years, or of 28 Metonic cycles. When Dionysius Exiguus (A.D. 530) altered the mode of reckoning, and abandoned the Diocletian era in favour of what he supposed to be the year of the birth of Christ, he adjusted the mode of reckoning employed by Victorinus accordingly, and the cycle of the latter has ever since been called Dionysian. From his time till that of the Gregorian reformation the rule was strictly observed, no disapprobation producing anything but written arguments. So that the Nicene Council neither succeeded, nor, we assert, intended to succeed, in doing more than destroying, among the great bulk of Christians, what was called the *quartadeciman* heresy, the opinion that Easter was to be kept on the fourteenth day of the moon. The settlement of the arithmetical or astronomical question is the work of Hilarius and Victorinus. Not but that these reformers considered themselves as fulfilling the intentions of the Nicene Council: in fact all parties, after the council, made it their authority; all dissentients assumed theirs to be the Nicene faith in this matter; and even the blunder of the British Parliament has been defended by supposing it to be the true intent of the assembled bishops in the fourth century.

The assumption of the so-called Dionysian cycle involved two errors. The Julian year being too long by about a day in 130 years, threw the vernal equinox back by a day in that time: while the rule of the cycle supposed that the equinox remained fixed on the 21st of March. Again, the cycle of nineteen years, which supposes 235 lunations to fill up that time exactly, was wrong in a manner which caused the new moons of the calendar to advance a day in every 300 years. The consequence was, that by the time of Pope Gregory XIII., in 1582, the equinox had receded to the 11th of March, while the calendar new moon generally fell on the fourth day following that of the real new moon. These errors were obvious enough to every astronomer. Sacrobosco and Roger Bacon pointed them out in the thirteenth century. The former says they must be borne on the authority of the council; the latter strongly recommended Pope Clement to make an amendment, and gave a reformed plan which is perfectly good. He had, and where he got it from we cannot gue, the length of the year more correctly than any of his predecessors or contemporaries. Cardinal Cusa and Regiomontanus, in the fifteenth century, pointed out the necessity of a change. Stöffler, Pitatus (who proposed the plan afterwards adopted with the leap years), Paulus Forosemproniensis (Bishop of Fossombrone), and others in the sixteenth century, wrote in advocacy of the same thing. The Council of Trent sanctioned an alteration, and referred the details to the see of Rome. A plan was presented to the pope by the relatives of one Aloysius Lilius, deceased, who had occupied himself with the subject. This plan was approved of, and in 1577 a circular was forwarded to princes and universities throughout the Catholic world, stating the nature of the intended alterations, and inviting suggestions. The Jesuit Clavius [CLAVIUS, P. C.] was the person, or the principal person, to whom the concoction of the scheme was intrusted. March 1, 1582, a bull was published, dated February 24th, 1581, abolishing the old calendar, giving a general description of the new one, and announcing that it would be fully explained in a forthcoming work. Clavius published this work, namely, 'Romani Calendarii a Gregorio XIII., Pont. Max. restituti Explicatio,' 4to. Rome, 1603; and it was reprinted in the folio collection of his works. We have nothing here to do with the alteration of the style, but only with what relates to Easter. This calendar had to undergo several severe attacks, particularly from Joseph Scaliger, Moestlinus, and Vieta [VIETA, P. C.]; but these of course produced no effect against established authority, nor, in truth, ought they to have done so in this instance. The calendar answers its purpose exceedingly well, and is, astronomically speaking, better than it was supposed to be by Clavius himself.

Referring for a full description of the details to the article in the 'Companion to the Almanac,' we shall give a slighter account of the process. Clavius held astronomical considerations to be secondary in importance to the general notions of his predecessors and contemporaries. One of these was, that it was not desirable ever to keep Easter on the same day as the Jews keep the Passover. To avoid this, he uniformly lessens the moon's age by a day, taking care, as much as possible, that all the necessary errors of the imperfect cycle shall have the same effect, namely, that of lessening the moon's age, or throwing the new moons forward. Accordingly, his new moons are seldom on the real day, generally one or two days in advance, about as much of one as of the other, and sometimes even three days in advance. It is therefore very important to remember that the moon of the calendar is not the moon of the heavens, and not even the mean moon of the astronomers. So that in the act of parliament, instead of the full moon (being the fifteenth or sixteenth day) of the heavens (the first day being that of new moon), should have been read the fourteenth day of the moon of the calendar. There is evidently a compensating effect: the fourteenth day of a moon, which begins for the most part one or two days after the moon of the heavens, is of course generally the fifteenth or sixteenth day of the moon of the heavens.

Clavius uses the Dionysian cycle in a way which we may describe as follows:—Neglecting the preceding arbitrary alteration, which may be made once for all when everything else is done, there are two things to be provided for. First, the defect of the cycle itself, the error of which is to advance the new and full moons by a day in about 300 years; Clavius took it to be eight days in 2500 years, and accordingly he allowed one day for seven periods of 300 years, and then one day for a period of 400 years, as we shall presently see. Next, the abandonment of three leap-years in every four centuries, which, though necessary for keeping the equinox at or about one day of one month, would destroy the efficiency of the cycle of nineteen years. There are then two shiftings, as it were, of the cycle necessary—arbitrary alterations of the moon's age at certain periods (we are now speaking only of the calendar moon). We shall now give a set of cycles, resembling that in EASTER, P. C., from which we shall be able to make the shifts apparent, and to connect them with the above-mentioned necessary corrections. Tables of this form were not given by Clavius himself, but were published in England, we believe, by Lord Macclesfield, at the time of the discussions preceding the alteration of the style in 1752.

In the first column are the days of the month, from March 21 to April 25, and Easter may fall on any one of these days except the first. In the second column are the dominical letters, explained in DOMINICAL LETTER, P. C., and which can be found by the table there given. In leap-year, take ***the second letter of*** the year in finding Easter. Then follow
certain columns, each of which has a heading to
years it belongs. Thus, the column headed 1
longs to all years from 1700 to 1899, both incl
columns contain the nineteen golden numbers
persed. Every year has its golden number fou
1 to the year and divide by 19; the remainder,
be no remainder, is the golden number.

		1583-1699.	1700-1899.	1900-2199.	2200-2299.	2300-2399.
March 21	C	3	14	—	6	17
22	D	—	3	14	—	6
23	E	11	—	3	14	—
24	F	—	11	—	3	14
25	G	19	—	11	—	3
26	A	8	19	—	11	—
27	B	—	8	19	—	11
28	C	16	—	8	19	—
29	D	5	16	—	8	19
30	E	—	5	16	—	8
31	F	13	—	5	16	—
April 1	G	2	13	—	5	16
2	A	—	2	13	—	5
3	B	10	—	2	13	—
4	C	—	10	—	2	13
5	D	18	—	10	—	2
6	E	7	18	—	10	—
7	F	—	7	18	—	10
8	G	15	—	7	18	—
9	A	4	15	—	7	18
10	B	—	4	15	—	7
11	C	12	—	4	15	—
12	D	1	12	—	4	15
13	E	—	1	12	—	4
14	F	9	—	1	12	—
15	G	—	9	—	1	12
16	A	17	—	9	—	1
17	B	6	17	17	9	—
18	C	14	6	6	17	9
19	D	—	—	—	—	—
20	E	—	—	—	—	—
21	F	—	—	—	—	—
22	G	—	—	—	—	—
23	A	—	—	—	—	—
24	B	—	—	—	—	—
25	C	—	—	—	—	—

Take the first of these columns, namely 158
posite to April 8 is written the number 15.
that, from 1583 to 1699, whenever the golden
the fourteenth day of the calendar moon is the
And so in like manner throughout these column
number is written opposite the day which is the
the calendar moon when that golden number
from 2600 to 2899, the fourteenth of the pasch
moon is always on the 2nd of April whenever
number is 16.

Let us now suppose the first column constr
contrived, as before noticed, so as to make the
moons follow the real ones. To keep this up, w
rations must be made in a cycle adapted to the re
same must be made for the calendar moon. A
no alteration is requisite, for Clavius does not m
alteration on account of the incorrectness of th
1800, and the year 1600 is leap-year in the Gre
dar as well as in the old one. The reader mu
that the cycle of nineteen years is one in which
year is leap-year. As soon as 1700 comes, we h
year which is not leap-year, so that the day whic
been called February 29 is called March 1, and
golden number then is written one place lower
1899: though it would better have represented
the change if each day of the month had been
place higher. The same thing takes place at 18
Clavius put the moon back a day, or makes his ca
a day older, to correct the accumulated error o
But the previous step makes the calendar moon,
day, a nominal day younger than it would oth
been. These two changes destroy each other's ef
and the cycle continues unaltered till 1899.
first change is repeated; but 2000 *is* leap-year
calendar, and therefore no change is then requ
again, though 2100 is not leap-year, yet as 300
elapsed, the correction for the fault of the cycle i

me with that for the abandoned leap-year, and
oy each other's effects, as before. This column
till 2199. The next column is now easily ex-
in the next one to that, or 2400-2499, we begin
which the correction for the cycle is to be made
destroyed by that arising from abandoning leap-
s, the moon, on any given day, is to be a day
would otherwise have been. The numbers must
put back a day, which is seen to be done. In
if it be remembered that, beginning at 1800,
ig corrections of the cycle are made at the end
300 years each, and then one at the end of 400
ider would be able to construct farther cycles for
were not for one peculiarity which we now

om of the columns it will be seen that there are
places numbers which do not rise or fall with
is was a sacrifice of uniformity to the desire of
characteristic of the old calendar, namely, that
of the calendar moon never fell on the same
ie month at any two epochs which were within
of each other. This would have happened
wing to the corrections above described: and
very simple method of avoiding it, which is
the article already cited. The effect of his
roduce the slight departure from uniformity of
re noted.
be seen that in the calendar which is now in
or even three days of error have not (provided
made too young, not too old) been thought of
quence as either case of calculation, or attention
tions upon the subject. Of this we entirely ap-
gree with Clavius in asserting that any rule
would be better than diversity of usage.
ter by the preceding table, first find the golden
hen the dominical letter. [DOMINICAL LETTER,
the proper column, and find out the day oppo-
he golden number stands. Go on from that day
llowing day which has the dominical letter op-
that day is Easter Sunday. For example, take
ne, and divide by 19: the remainder is 5, the
r. The dominical letter found in the article
n the column 1700-1899, we find 5 opposite to
hich is the fourteenth of the calendar moon.
opposite April 4, which is Easter Sunday.
ind Easter in 2384. Divide 2385 by 19, and
is 10, the golden number. The dominical
ond) is G. In the column 2300-2399 the 10 is
pril 7, and the next G is opposite to April 8,
er Sunday.
ical letter may be found by a short calculation,

to the given year.
he quotient of the given year, divided by four,
remainder.
16 from the centurial figures of the given year,
ne.
III. by 4, neglecting the remainder.
he sum of I., II., and IV., subtract III.
mainder of V., after division by 7, is the number
inical letter in

G	F	E	D	C	B	A
0	1	2	3	4	5	6

ear be leap-year, it is the second dominical letter
found.
s, take 1847 and 2384, as above given.

I.	1848	2385
II.	461	596
III.	2	7
IV.	0	1
V.	2307	2975
VI.	4 (C)	0 (G)

is for new style; for old style proceed as follows.
r of the year add its quotient when divided by
remainder, after division by 7, is to be used as
preceding rule. Thus for 1583, we have
1583
395
4
——
1982
——
283 Rem. 1. Dominical Letter F.

The cycle for Easter-day, old style, is given in the article EASTER, P. C.

The sole authority on the subject of the Gregorian Calendar is, of course, Clavius, the authorised contriver of it, or at least the person to whom the other delegates of the Roman see (if indeed any of them took any share in the execution of the plan) intrusted the explanation of it. In his work already mentioned, he has given all the results for every year from 1600 to 5000: he thinks his rule will be correct enough as far as 8000. On the mathematical part of the calendar full information will be found in Delambre's 'Histoire de l'Astronomie Moderne,' and Lalande's 'Astronomy.'

With regard to the faulty explanation in the act of Parliament, we find that it was copied literally from the Book of Common Prayer. In this work it appeared for the first time in 1662, directly after the convocation which met at the Restoration of the monarchy had made the alterations mentioned in LITURGY, P. C. The explanation was therefore added by this convocation. Supposing the calendar moon to be spoken of, it would have been correct if the second clause had been omitted. For the calendar full moon is always the fifteenth day, and it is clear that 'the Sunday after the fourteenth, or the next Sunday if the fourteenth fall on Sunday,' is the same thing as 'the Sunday after the fifteenth, or the fifteenth itself, if it be Sunday.' Finding definitions of Easter by the fifteenth, in the second of the two ways just mentioned, to have occurred in times anterior to the Restoration, we suppose that the explanation of 1662 was the result of a confusion of the two.

EASTER-DUES. [OFFERINGS, P. C. S.]

EASTERN EMPIRE. [ROMAN EMPIRE, P. C. S.]

ECCENTRIC, in Machinery. [EXCENTRIC, P. C. S.]

ECCLESIASTICAL COMMISSIONERS FOR ENGLAND. On the ground that it was 'expedient that the fullest and most attentive consideration should be forthwith given to ecclesiastical duties and revenues,' a royal commission was issued, dated 4th February, 1835, which appointed certain commissioners, and directed them 'to consider the state of the several dioceses in England and Wales, with reference to the amount of their revenues and the more equal distribution of episcopal duties, and the prevention of the necessity of attaching, by commendam, to bishoprics benefices with cure of souls;' and the commissioners were further directed 'to consider also the state of the several cathedral and collegiate churches in England and Wales, with a view to the succession of such measures as may render them conducive to the efficacy of the Established Church; and to devise the best mode of providing for the cure of souls, with special reference to the residence of the clergy on their respective benefices.' The commissioners were required to report their 'opinions as to what measures it would be expedient to adopt' on the several points submitted to their consideration.

The commissioners were the archbishops of Canterbury and York, the bishops of London, Lincoln, and Gloucester, the lord chancellor, the first lord of the Treasury (Sir Robert Peel), and several members of the government, with other laymen. A change in the cabinet having occurred a few months afterwards, a new commission was issued on the 6th of June, 1835, for the purpose of substituting the names of members of the new cabinet.

The four Reports presented by the commissioners were respectively dated 17th March, 1835, and 4th March, 20th May, and 24th June, 1836. A fifth Report was prepared, but it had not been signed when the death of King William IV. occurred, and it was presented as a parliamentary paper (Sess. 1838 (66), xxviii. 9).

The First Report related to the duties and revenues of bishops. The commissioners recommended various alterations of the boundaries of dioceses, the union of the sees of Gloucester and Bristol, the union of the sees of Bangor and St. Asaph, and the erection of sees at Ripon and Manchester. They calculated the net income of the bishoprics of England and Wales at 148,875*l*., but from the unequal manner in which this revenue was distributed, the income of one-half of the bishoprics was below the sum necessary to cover the expenses to which a bishop is unavoidably subject; and to remedy this state of things, and with a view of doing away with commendams and diminishing the motives for translations, they recommended a different distribution of episcopal revenues.

The Third Report also related to episcopal matters.

The Second and Fourth Reports, and the draft of the Fifth Report, related to the cathedral and collegiate churches and to parochial subjects. They recommended the appropriation of part of the revenues of the cathedral and collegiate churches, and the entire appropriation of the endowments for non-residentiary prebends, dignities, and officers, and that the proceeds in both cases should be carried to the account of a fund out of which better provision should be made for the cure of souls.

The Commissioners stated in their Second Report that they had prepared a bill for regulating pluralities and the residence of the clergy; and in 1838 an act was passed (1 & 2 Vict. c. 106) relating to these matters.

On the 13th of August, 1836, an act was passed (6 & 7 Wm. IV. c. 77) which established the ecclesiastical commissioners as 'one body politic and corporate, by the name of the "Ecclesiastical Commissioners for England."' The number of commissioners incorporated was thirteen, of whom eight were ex-officio, namely, the archbishops of Canterbury and York, the bishop of London, the lord chancellor, the lord president of the council, the first lord of the Treasury, the chancellor of the Exchequer, and such one of the principal secretaries of state as might be nominated under the sign manual. There were five other commissioners, of whom two were bishops; and these five were removeable at the pleasure of the crown. The laymen who were appointed were required by the act to subscribe a declaration as to their being members of the United Church of England and Ireland by law established.

By an act passed 11th August, 1840 (3 & 4 Vict. c. 113), the constitution of the Ecclesiastical Commission was considerably modified by increasing the number of ex-officio members, and by other alterations. In addition to the members constituted ex-officio commissioners under the act 6 & 7 Wm. IV. c. 77, the following were by this act also appointed:—all the bishops of England and Wales, the deans of Canterbury, St. Paul's, and Westminster, the two chief justices, the master of the rolls, the chief baron, and the judges of the Prerogative and Admiralty Courts. By this act the crown is empowered to appoint four, and the archbishop of Canterbury two laymen as commissioners in addition to the three appointed under the former act. Under the former act the commissioners were removeable by the crown; but now each commissioner continues a member of the corporation 'so long as he shall well demean himself in the execution of his duties.' Lay members are required as before to subscribe a declaration that they are members of the Established Church.

Five commissioners are a quorum at meetings of which due notice has been given. The chairman, who has a casting vote, is the commissioner present first in rank; and if the rank of all the commissioners present be equal, the chair is to be taken by the senior commissioner in the order of appointment. Two of the episcopal commissioners must be present at the ratification of any act by the common seal of the corporation; and if they, being the only two episcopal commissioners present, object, the matter is to be referred to an adjourned meeting. The commissioners may summon and examine witnesses on oath, and cause papers and documents to be produced before them.

The act (6 & 7 Wm. IV. c. 77) empowers the ecclesiastical commissioners to prepare and lay before his majesty in council such schemes as shall appear to them to be best adapted for carrying into effect the recommendations contained in the five Reports already mentioned, with such modifications or variations as to matters of detail and regulation as shall not be substantially repugnant to any or either of those recommendations. The king, by an order in council, ratifies these schemes, and appoints a time for their coming into operation. This order must be registered by the diocesan registrar of the diocese within which the place or district affected by the order is situated, and it must also be published in the 'London Gazette.' A copy of all the orders issued during the preceding twelve months must be presented annually to parliament within a week after its meeting. As soon as an order is registered in the diocese, and gazetted, it has the same force as if it had been included in the acts for carrying into effect the Reports of the Commissioners.

By special enactments, and by the joint authority of the Queen in council and the Ecclesiastical Commissioners, changes of great importance have been made in relation to ecclesiastical revenues and duties.

The first act (6 & 7 Wm. IV. c. 77) is entitled 'An Act for carrying into effect the Reports of the Commissioners appointed to consider the state of the Established Church in England and Wales, with reference to Ecclesiastical Duties and Revenues, so far as they relate to Episcopal D
venues, and Patronage.' By this act the dioceses
and Wales have been re-arranged, four sees have
lidated into two, two new sees have been creat
tronage of the several bishops has been more equa
commendams are abolished, and the revenues of
sees have been also more equally apportioned. T
tion of archdeacons was also settled by the Act.

The second act (3 & 4 Vict. c. 113) was
August, 1840, and is entitled 'An Act to carry
with certain modifications, the Fourth Report of
missioners of Ecclesiastical Duties and Revenues
enactments also comprehend some of the propos
Second Report and of the draft Fifth Report. The
ject of the act is the cathedral and collegiate ch
the application of parts of their revenues to spiritu
tion in parishes. The act made some change in the
tion of deans and chapters, suspended a large n
canonries, founded honorary canonries, abolished
dentiary deaneries and sinecure rectories in public pa
deprived non-residentiary prebends and other si
offices in cathedral and collegiate churches of the en
formerly attached to such offices. Self-elected
chapters are abolished: deans are to be appoin
crown, and the canons by the bishops. Sinecure r
private patronage may be bought by the Commis
suppressed. The profits of these dignities and
sinecure rectories, are vested in the Ecclesiastical
sioners, and are carried to a common fund, out of w
tional provision is to be made for the cure of souls
where such assistance is most required. Thus th
vided that a portion of the proceeds of prebends s
Lichfield Cathedral should be devoted to making p
the rector of St. Philip's, Birmingham, and for the
curate of Christ Church in the same town; that
ments belonging to the collegiate churches of Wolv
Heytesbury, and Middleham should be applied
better provision for the cure of souls in the di
which those places are connected; and that the end
the collegiate church of Wimborne minster should
with a like object to the parish of Wimborne minste
empowers the commissioners to annex the whole o
the endowments of sinecure rectories abolished by
purchased to the vicarages or perpetual curacies de
them, when the extent of the population or the
endowment of such vicarages or curacies may rend
dient. Sinecure preferments may be annexed
with cure of souls. Benefices may be divided or
with consent of patrons. Arrangements may be
better provision for the spiritual duties of ill endow
by exchange of advowsons or other alterations in
of patronage. When two benefices belong to
patron, the income may be differently apportion
consent.

A third act was passed 21st June, 1841 (4 & 5
Its chief object was to amend and explain the two
but it contains various enactments calculated to
principle of the first two acts as to various reg
details.

In each of the acts for carrying into effect the r
tions of the Ecclesiastical Commissioners, vested
specially protected.

From a return presented to Parliament, it a
down to May 1st, 1844, the number of benefices
whose incomes had been augmented by the E
Commissioners for England, was 496, and that
augmentation amounted to the sum of 25,779*l.*

There is in Ireland a body styled the Ecclesia
missioners, who were appointed under the act 3 &
c. 37 ('Church Temporalities Act'), and are em
receive the incomes of bishoprics on their becomin
pursuance of the above-mentioned act.

ECCLESIASTICAL COURTS. Courts in
canon law is administered [CANON LAW, P. C.],
ecclesiastical determined. Coke, in treating of th
between temporal and spiritual causes, says:—'An
poral causes, the king by the mouth of his judges
of justice, doth judge and determine the same by
laws of England, so, in causes ecclesiastical and
namely, blasphemy, apostacy from Christianity
schisms, ordering admissions, institutions of clerks,
of divine service, rights of matrimony, divorces,
tardy, substraction and right of tithes, oblations,

s, reparation of churches, probate of testaments,
on and accounts upon the same, simony, incests,
, adulteries, solicitation of chastity, pensions, pro-
ippeals in ecclesiastical causes, commutation of
d others (the cognizance whereof belongeth not
ion laws of England), the same are to be decided
by ecclesiastical judges according to the king's
l laws of this realm.'

1830, a Commission was appointed to inquire into
and Jurisdiction of the Ecclesiastical Courts in
id Wales. The Report of the Commissioners,
presented in 1831, was signed by the archbishop
ry, and three of the bishops, the two chief jus-
iief baron, and several other persons of authority
ice. This report gives the most correct and
count which exists of—1, The nature of the eccle-
urts; 2, Of the course of proceeding in eccle-
s; and 3, The nature of the processes, practice,
igs of the ecclesiastical courts. The report in
s been almost solely used in the present article,
pridgment and slight alterations as were necessary
within the requisite space which could be devoted
t.

iary ecclesiastical courts are—1, The *Provincial*
ig, in the province of Canterbury, the Court of
Supreme Court of Appeal, the Prerogative or Tes-
ourt, and the Court of Peculiars; and in the pro-
rk, the Prerogative or Testamentary Court, and
ry Court; 2, The *Diocesan Courts*, being the
court of each diocese, exercising general jurisdic-
purt or courts of one or more commissaries ap-
he bishop, in certain dioceses, to exercise general
within prescribed limits; and the court or courts
iore archdeacons or their officials, who exercise
imited jurisdiction, according to the terms of thèir
o local custom. 3. There are also *Peculiars* of
riptions in most dioceses, and in some they are
us: royal, archiepiscopal, episcopal, decanal, sub-
bendal, rectorial, and vicarial; and there are also
ial courts, which exercise testamentary jurisdic-

incial Courts of the archbishop of Canterbury,
bishop of York, are independent of each other;
of one province does not run into the other, but
requisition from the court of one province to the
ty of the other, for execution, when it is neces-
appeal from each of the provincial courts lies to
Committee of Privy Council; but before the
he statute 2 & 3 Wm. IV. c. 92, the appeal was
and a commission issued under the Great Seal in
ual case of appeal, to certain persons or delegates,
determine the matter in contest. [DELEGATES,
P. C.]

three Archiepiscopal Courts of Canterbury, the
rt is the first. [ARCHES, COURT OF, P. C.] This
ses appellate jurisdiction from each of the dio-
ost of the peculiar courts within the province. It
e original cognizance of causes by letters of re-
each of those courts; and it has original jurisdic-
traction of legacy given by wills proved in the
Court of Canterbury.

ogative Court has jurisdiction of all wills and ad-
s of personal property left by persons having *bona*
effects of a certain value, in divers ecclesiastical
within the province. A very large proportion,
four fifths of the whole contentious business, and
larger part of the uncontested, or as it is termed
n business, is despatched by this court. Its au-
cessary to the administration of the effects of all
g possessed of personal property to the specified
in the province, whether leaving a will or dying
nd from the very great increase of personal pro-
g from the public funds and the extension of the
capital of the country, the business of this jurisdic-
deciding upon all the contested rights, and as
ll instruments and proofs in respect of the succes-
property, is become of very high public import-

t of Peculiars, which is the third Archiepiscopal
nterbury, takes cognizance of all matters arising
aneries: one of these deaneries is in the diocese
another in the diocese of Rochester, another in
of Winchester, each comprising several parishes; and some others, over which the archbishop exercises ordinary jurisdiction, and which are exempt from and independent of the several bishops within whose dioceses they are locally situated.

The province of Canterbury includes twenty-one dioceses, and therein the diocese of Canterbury itself, where the ordinary episcopal jurisdiction is exercised by a commissary, in the same manner as in other dioceses.

The province of York includes five dioceses, besides that of Sodor and Man, and the archiepiscopal jurisdiction is exercised therein much in the same manner as in the province ot Canterbury.

The Diocesan Courts take cognizance of all matters arising locally within their respective limits, with the exception of places subject to peculiar jurisdiction. They may decide all matter of spiritual discipline; they may suspend or deprive clergymen, declare marriages void, pronounce sentence of separation à mensâ et thoro, try the right of succession to personal property, and administer the other branches of ecclesiastical law.

The Archdeacon's Court is generally subordinate, with an appeal to the Bishop's Court; though in some instances it is independent and co-ordinate.

The Archdeacons' Courts, and the various Peculiars already enumerated, in some instances take cognizance of all ecclesiastical matters arising within their own limits, though the jurisdiction of many of the peculiar courts extends only to a single parish: the authority of some of them is limited to a part only of the matters that are usually the subject of ecclesiastical cognizance; several of the peculiars possess voluntary but not contentious jurisdiction.

The total number of courts which exercise any species of ecclesiastical jurisdiction in England and Wales is 372, which may be classed as follows:—

Provincial and diosesan courts	36
Courts of bishops' commissaries	14
Archidiaconal courts	37
PECULIAR JURISDICTIONS.	
Royal	11
Archiepiscopal and episcopal	44
Decanal, subdecanal, &c.	44
Prebendal	88
Rectorial and vicarial	63
Other peculiars	17
Courts of lords of manors	48

In 1843 the gross fees, salaries, and emoluments of the judges, deputy-judges, registrars, deputy-registrars, and all other officers in the ecclesiastical courts of England, Wales, and Ireland, amounted to 120,513*l.*, as follows:—

	£
England	101,171
Wales	4,882
Ireland	14,459

The ecclesiastical jurisdiction comprehends causes of a civil and temporal nature; some partaking both of a spiritual and civil character, and, lastly, some purely spiritual.

In the first class are testamentary causes, matrimonial causes for separation and for nullity of marriage, which are purely questions of civil right between individuals in their lay character, and are neither spiritual nor affect the church establishment.

The second class comprises causes of a mixed description, as suits for tithes, church-rates, seats, and faculties. As to tithes, however, the courts of common law can restrain the ecclesiastical courts from trying any cases of modus or prescription, if either of the parties apply for a prohibition.

The third class includes church discipline, and the correction of offences of a spiritual kind. They are proceeded upon in the way of criminal suits, pro salute animæ, that is, for the safety of the offender's soul, and for the lawful correction of manners. Among these are offences committed by the clergy themselves, such as neglect of duty, immoral conduct, advancing doctrines not conformable to the Articles of the church, suffering dilapidations, and the like offences; also by laymen, such as brawling, laying violent hands on any person, and other irreverent conduct in the church or churchyards, violating churchyards, neglecting to repair ecclesiastical buildings, incest, incontinence, defamation; all these are termed 'Causes of Correction,' except defamation, which is of an anomalous character. These offences are punished by monition, penance, excommunication, formerly, and now in place of it imprisonment for a term not exceeding six months [EXCOMMUNICA-

TION, P. C.], suspension ab ingressu ecclesiæ, suspension from office and deprivation.

The canon law has been practised in the ecclesiastical courts as a distinct profession for upwards for three centuries. The rules for the admission of advocates are given in ARCHES, COURT OF, P. C. S. The residence of the judges and advocates, and the proper buildings for holding the Ecclesiastical and Admiralty Courts, are at Doctors' Commons, the site of which was purchased by some members of this body in 1567. [DOCTORS' COMMONS, P. C.] The members of the society were incorporated in 1768 by a royal charter, under the name of 'The College of Doctors of Laws exercent in the Ecclesiastical and Admiralty Courts.' The proctors discharge duties similar to those of solicitors and attorneys in other courts. [PROCTOR, P. C.]

The course of proceeding in these courts is as follows:—The mode of commencing the suit, and bringing the parties before the court, is by a process called a Citation, or summons. This citation, in ordinary cases, is obtained as a matter of course, from the registry of the court, and under its seal; but in special cases, the facts are alleged in what is termed an act of court, and upon those facts the judge or his surrogate decrees the party to be cited; to which, in certain cases, is added an intimation, that if the party does not appear, or appearing does not show cause to the contrary, the prayer of the plaintiff, set forth in the decree, will be granted. The party cited may either appear in person, or by his proctor, who is appointed by an instrument, under hand and seal, termed a proxy. The proctor thus appointed represents the party, acts for him and manages the cause, and binds him by his acts.

In Testamentary causes, the proceeding is sometimes commenced by a Caveat, which may be entered by a party interested in the effects of the deceased person, against the grant of probate of will or letters of administration, without notice being first given to him who enters the caveat. This caveat is then *warned* by the party who claims the representation either as executor or administrator, which is in effect a notice to the proctor who enters the caveat, that he must appear and take further steps, if he intends to continue his opposition. Both parties are then assigned by order of court to set forth their respective claims, and the suit thus commences, either to try the validity of an alleged will, or the right to administration, either under an intestacy or with a will annexed. [ADMINISTRATION, P. C.; EXECUTOR, P. C.]

There is another process in testamentary matters extremely useful and frequently resorted to. The executor, or other person who claims the grant of probate of a will or other testamentary instrument, may cite the next of kin and other parties interested, under an intestacy or a former will, to appear and see the will propounded and proved by witnesses; and if the parties cited do not appear and oppose the probate, they are barred from afterwards contesting its validity, unless on account of absence out of the kingdom, or some other satisfactory cause.

So again, the next of kin, or other parties entitled either to the grant of letters of administration or under a former will, may cite the executor or other person apparently benefited under a suggested will or testamentary instrument, to appear and propound it; or otherwise show cause why probate should not be granted of the suggested will of the deceased, on the ground of his having died intestate, or why probate should not be granted of a former will; and the parties cited, not appearing, are barred from afterwards setting up the will. But if probate or administration be taken in common form, without citing persons who have an adverse interest, the grant may afterwards be called in, and the executor or administrator cited, and put upon proof of his right, as if no such common form grant had issued. Again, where no grant is applied for by the person primarily entitled to it, such as an executor, residuary legatee, or next of kin, process may be taken out by any person who claims an interest in the effects of the deceased, such as a legatee, a party entitled to a distributive share of the estate, or a creditor, but he must call upon the persons primarily entitled to accept or refuse the grant, or otherwise show cause why it should not pass to such person who claims an interest. Or if a person be dead intestate, without leaving any known relations, a creditor may obtain letters of administration, upon advertising for next of kin in the Gazette and a morning and evening newspaper, provided he serves a process on the Royal Exchange and on the king's proctor, but the Crown has a right to take the grant, if it makes the claim.

In all these and similar cases, the facts must be supported
by affidavit, all due notice is required to be give
grant is moved for before the court, at its sitting.

The mode of enforcing all process, in case of di
is by pronouncing the party cited to be contuma
if the disobedience continues, a significavit issues,
an attachment from Chancery is obtained, to im
party till he obeys. In cases where some act is
be done by the party cited, to exhibit an invento
count, for instance, or to pay alimony, the compuls
is enforced; but in some cases, where no act is
be done by the party cited, the plaintiff may
pœnam contumaciæ, and the cause then goes on
if the defendant had appeared. The party cited,
contumacy, may appear under protest, and may
against being cited; such as, that the court has
in the subject-matter, or that he is not amenable
diction: this preliminary objection is heard upon
affidavits; and either the protest is allowed, and
ant is dismissed, or the protest is overruled, and the
is assigned to appear absolutely; and costs are
against the unsuccessful party. Either party
from the decision on this preliminary point; or
in case the judge decides against him on the
diction, and on some other questions, may apply
law for a prohibition.

Some other points, such as the claim to
among persons of admitted equal degree of kindred,
to an inventory and account, and other similar
be heard upon petition and affidavit, where the fact
such a nature as to require investigation in the
proceeding of regular pleadings and depositions
benefit of cross-examining witnesses.

The form of the pleadings is next to be describ
are intended to contain a statement of the facts
and proposed to be proved by each party in the
grounds of the action, and of the defence.

Causes, in their quality, are technically classed
as plenary and summary, though in modern pract
substantially little difference in the mode of proce
causes in the Prerogative Court are summary.

The first plea bears different names in the differ
tions of causes. In criminal proceedings, the
termed the Articles; in form, it runs in the
judge, who articles and objects the facts charged
defendant; in plenary causes, not criminal, the
termed the Libel, and runs in the name of the
proctor, who alleges and propounds the facts
demand; in testamentary causes, the first plea is
Allegation. Every subsequent plea, in all ca
responsive or rejoining, and by whatever party
termed an Allegation.

Each of these pleas contains a statement of the
which the party founds his demand for relief, or
they resemble the bill and answer in equity, exce
allegation is broken into separate positions or
facts are alleged under separate heads, according
ject-matter, or the order of time in which they ha
Under this form of pleading the witnesses are
examined only to particular articles of the alleg
contain the facts within their knowledge; a notice
tion of the witnesses is delivered to the adverse p
thereby distinctly apprised of the points to which
address his cross-examination of each witness, as
matters which it may be necessary for him to c
explain by counter-pleading.

Before a plea of any kind, whether articles, lib
gation, is admitted, it is open to the adverse par
to its admission, either in the whole or in part: in
when the facts altogether, if taken to be true, will
the party giving the plea to the demand which he
to support the defence which he sets up; in part
the facts pleaded are irrelevant to the matter in iss
not be proved by admissible evidence, or are i
proof. These objections are made and argued
judge, and decided upon by him, and his decision
pealed from. For the purpose of the argument,
capable of proof are assumed to be true: they are
assumed merely for the argument, but are not so
the cause; for the party who offers the plea is no
afterwards to prove the facts, and the party who
the plea is no less at liberty afterwards to contradic
If the plea is admitted, the further opposition m
drawn: if the plea is rejected, the party who offe

ns the suit, or appeals against the rejection, in order to e judgment of a superior tribunal. When a plea has lmitted, a time, or term probatory, is assigned to the rho gives the plea, to examine his witnesses; and the party is assigned, except in criminal matters, to give nswers upon oath, to his knowledge or belief of the leged. The defendant may proceed then, if he thinks , or he may wait until the plaintiff has examined his es, to give an allegation controverting his adversary's This responsive allegation is proceeded upon in the manner; objections to its admissibility may be taken, s upon oath be required, and witnesses examined. The f may, in like manner, reply by a further allegation; that, or any subsequent allegation, the same course is d.

aking evidence the witnesses are either brought to London be examined, or they are examined by commission near places of residence. Their attendance is required by a pulsory, somewhat in the nature of a subpœna, obe- to which is enforced in the same way as in other cases tumacy. The examination is by depositions taken in and in private by examiners of the court, employed purpose by the registrars. The examination does not ace upon written interrogatories previously prepared own; but the allegation is delivered to the examiner, fter making himself master of all the facts pleaded, ex- the witnesses by questions which he frames at the as to obtain, upon each article of the allegation sepa- the truth and the whole truth, as far as he possibly pecting such of the circumstances alleged as are within owledge of each witness. The cross-examination is ted by interrogatories addressed to the adverse wit- and when the deposition is complete, the witness is ed upon the interrogatories delivered to the examiner adverse proctor, but not disclosed to the witness till e examination in chief is concluded and signed, nor to rty producing him till publication passes; and each is enjoined not to disclose the interrogatories, nor any his evidence, till after publication. In order that the ddressing the interrogatories may be the better pre- the proctor producing the witness delivers, as before a designation, or notice of the articles of the plea on is intended to examine each witness produced.

examination and cross-examination of witnesses are kept til publication passes, that is, until copies of the de- may be had by the adverse parties, after which either is allowed to except to the credit of any witness, upon contained in his deposition. The exception must be d to such matter, and not made to general character, t must be pleaded before publication; nor can the ex- refer to matter before pleaded, for that should be con- d also before publication. The exception must also show that the witness has deposed falsely and cor- The exceptive allegations are proceeded upon, when ed, in the same manner as other pleas. They are not ily offered, and are always received with great caution rictness, as they tend more commonly to protract the d to increase expense than to afford substantial infor- in the cause. It is always however in the power of urt to allow further pleading in a cause; and if new stances of importance are unexpectedly brought out by errogatories, the court will, in the exercise of its dis- , allow a further plea after publication. This may also mitted in cases where facts have either occurred or come knowledge of the party, subsequently to publication passed.

evidence on both sides being published, the cause is wn for hearing. All the papers, the pleas, exhibits itten papers proved in the cause), interrogatories, and tions are delivered to the judge for perusal before hear- case fully discussed by counsel. All causes are heard ly in open court; and on the day appointed for the g, the cause is opened by the counsel on both sides, tate the points of law and fact which they mean to in in argument: the evidence is then read, unless the signifies that he has already read it, and even then par- parts are read again, if necessary, and the whole case ed and discussed by the counsel. The judgment of urt is then pronounced upon the law and facts of the and in doing this the judge publicly, in open court, assigns asons for his decisions, stating the principles and au- es on which he decides the matters of law, and reciting erring to the various parts of the evidence from which he deduces his conclusions of fact, and thus the matter in controversy between the parties becomes adjudged.

The execution of the sentence, in case there be no appeal interposed, is either completed by the court itself, according to the nature of the case—such as by granting probate or letters of administration, or signing a sentence of separation—or remains to be completed by the act of the party, as by exhibiting an inventory and account, by payment of the tithes sued for, and other similar matters, in which cases execution is enforced by the compulsory process of contumacy, significavit, and attachment. The question of costs in these courts is, for the most part, a matter in the discretion of the judge, according to the nature and justice of the case; and the reasons for granting or refusing costs are publicly expressed at the time of giving the judgment.

Attempts were made more than three centuries ago, to remedy the defects of the ecclesiastical courts. The earliest efforts of this kind were directed to the peculiar jurisdictions. Some of these jurisdictions extend over large tracts of country, and embrace many towns and parishes; others comprehend several places lying at a great distance apart from each other; and some only include one or two parishes. The jurisdiction to be exercised in these courts is not defined by any general law, and it is often difficult to ascertain to what description of cases the jurisdiction of any particular court extends. The commissioners appointed to revise the ecclesiastical laws, in the reigns of Henry VIII. and Edward VI., recommended that the power of the bishop, in matters of discipline, should extend to all places in the diocese, notwithstanding the exemptions and privileges of Peculiars. In the reign of Queen Elizabeth, it was proposed or talked of in convocation that parliament should be applied to, to subject peculiar and exempt rites and jurisdictions of what had belonged to monasteries to the diocesan. Nothing, however, appears to have been done.

In 1812 Sir W. Scott (Lord Stowell) brought a bill into parliament which passed the House of Commons, but was afterwards dropped in the Lords, which provided that 'the power of hearing and determining contested causes of ecclesiastical cognizance should be exercised only by ecclesiastical courts sitting under the immediate commission and authority of the archbishops and bishops, and not by inferior or other ecclesiastical courts.'

In 1832 the commissioners appointed to inquire into the practice and jurisdiction of the ecclesiastical courts, recommended a number of important changes in these courts. In 1833 the Real Property Commissioners expressed an opinion in favour of their extensive reform. In the same year a select committee of the House of Commons made a report in which similar views were urged, and in 1836 a select committee of the House of Lords adopted the same course. From 1836 until the present time several bills have been brought in for amending the ecclesiastical courts, none of which were carried. In 1836 Lord Cottenham brought in an ecclesiastical courts bill. On opening the session of parliament in 1842 a measure for the improvement of the ecclesiastical courts was announced in the speech from the throne; but the bill brought in by the government lingered through the session and was finally abandoned. In 1843 and 1844 other bills with the same object were equally unsuccessful. In the session of 1845 Lord Cottenham brought in an ecclesiastical courts bill, which was identical or nearly so with his bill of 1836. It proposed the establishment of a central court in London, to which all bills were to be sent. Surrogates to act in the towns where there are now diocesan courts, and to grant probates where the amount of property is small, but in every case the will to be sent to London to be registered. The central court to retain the power of the old courts in questions of divorce. In matters relating to church-rates the bill gave an appeal to quarter-sessions where the rate had been illegally levied; and in that of tithes the power of the ecclesiastical courts was to be abolished altogether. The criminal jurisdiction of these courts, and the power of punishing for defamation, incest, and brawling in churches, was also to be abolished. Although approved of by the Lord Chancellor, Lord Cottenham's bill met with the fate of its predecessors, and towards the close of the session it was found impossible to get it passed amidst the crowding of other bills, to which the support of the government was more directly pledged.

By a clause in 6 & 7 Will. IV. c. 77, which was an act for carrying into effect the Reports of the Ecclesiastical Commissioners of 1835, it was enacted that future appointments in any of the ecclesiastical courts in England and Wales (except the Prerogative Court of Canterbury) were not to give a vested interest in any office, nor any claim or title to compensation in case of the abolition of offices.

ECCULIO′MPHALUS, a genus of fossil Gasteropoda, from the mountain limestone chiefly. (Portlock.)

ECHINO′CHLOA (from ἐχῖνος, a hedgehog, and χλόη, grass), a genus of grasses belonging to the tribe Paniceæ. It has compound spikes, secund in the whole and in each part; spikelets on one side of a flattened rachis, 2-flowered, the inferior flower rudimentary; 2 glumes, the lower small, 3-nerved, the upper as long as the flower, 5-nerved mucronate; the outer palea of the sterile flower resembling and equalling the upper glume. This is a genus of coarse grasses, of which only one species, the *E. Crus-galli*, grows in Great Britain. It is a strong coarse grass, bearing any climate better than most others, and is found in the vicinity of London.

(Babington's *Manual.*)

ECHINOLA′MPAS, a genus of fossil Echinida, from the oolitic and chalk strata. (Gray.)

ECHINO′PHORA (from ἐχῖνος, a hedgehog, and φορος, in composition signifying 'bearing'), a genus of plants belonging to the natural order Umbelliferæ, and to the tribe Smyrneæ. It has a calyx of 5 teeth, the petals obcordate with an inflexed point, the exterior large and bifid; the flowers of the ray sterile on long stalks, the central fertile and solitary; the fruit ovate terete, embedded in the enlarged receptacle; the carpels with five depressed equal striated wavy ridges; interstices with single vitta, covered by a cobweb-like membrane. The *E. spinosa*, the sea-parsnip, has been admitted into the British Flora, but it must be considered a doubtful native. It has been found in Lancashire and Kent. It is mostly an inhabitant of sandy sea-shores, and has pinnate spinose leaves, and resembles in habit and external character the Eryngium. Three other species are described. When cultivated they require a warm situation and a dry soil. They must be propagated by cuttings of the roots or stems.

(Don, *Gardener's Dictionary*.)

ECHINO′STACHYS, a genus of fossil plants, from the Bunter sandstein. (Brongniart.)

E′CHIUM (from ἔχις, a viper) a genus of plants belonging to the natural order Boraginaceæ. It has a calyx with 5 deep segments; the corolla sub-bell-shaped, throat dilated, naked, limb irregular; the stamens exserted, filaments very long, unequal, style bifid; the nuts wrinkled, attached by a flat triangular base. The species are rough, shrubby, or herbaceous plants, with lanceolate or oblong-lanceolate leaves, and blue or white flowers.

E. vulgare, Viper's bugloss, is covered with hispid tubercles, has an erect simple stem, the leaves lanceolate, 1-ribbed, the stem-leaves narrowed below, sessile, the flowers in short lateral spikes, the stamens longer than the corolla. It is a native of dry places in Great Britain and throughout Europe. It is a remarkably handsome plant. The flowers are at first reddish and afterwards become blue.

E. violaceum is a pilose-hispid plant, with an erect branched diffuse stem, the lower branches prostrate, the radical leaves oblong ovate, stalked, the stem leaves oblong narrowed from a cordate half-clasping base with lateral ribs, the spike panicled elongate simple, the stamens scarcely longer than the corolla. The root of this plant is red, and when kept in an herbarium stains the paper of a violet colour. It is a native of Jersey, also of the South of Germany, Spain, France, Italy, and the South of Taurida.

E. giganteum has a branched stem, hoary at top, with petiolate lanceolate leaves attenuated at the base; the panicles thyrsoid; the spikelets bifid. This plant is a shrub, with whitish blue flowers, and attains a height of 8 or 10 feet, and is one of the largest species of the genus: it is a native of Teneriffe.

Above eighty species of this genus have been described; they inhabit the temperate parts of all quarters of the globe, but are more especially European. A large number of the shrubby species are natives of the Canary Islands, and another entirely different group are inhabitants of the Cape of Good Hope. The great bulk of the European species are herbaceous, as well as those which inhabit South and North America. All the species are worthy of cultivation, and the European species are amongst the handsomest of the indigenous plants of Europe. The shrubby species are all greenhouse plants, and will grow in a mixture of sand, loam, and peat; and cuttings will strike under a hand-glass in this mixture. They may be also propagated by layering and by seed, which
sometimes come to perfection in this country.
species will grow very well in any common gard
may be propagated by seeds sown in an open bo
spring; their general treatment must be the
perennial, biennial, and annual plants. They are w
for flower borders, and afford a pleasing variety,
ferent shades of blue which they exhibit.

(Don, *Gardener's Dictionary*; Babington, *Man*
tish Botany.)

EDA′PHODON, a genus of fossil Placoid fish
London clay and Bagshot sand, three species. (A

EDICTAL LAW. The English Equity has s
blance to the Roman Edictal Law, or Jus Pra
Honorarium, as it is often called. All the high
magistrates (magistratus majores) had the Jus E
authority to promulgate Edicta. These magistra
were Consuls, Praetors, Curule Aediles, and Cen
virtue of this power a magistrate made Edicta or ord
temporary and for particular occasions (edicta repe
upon entering on his office he promulgated rule
which he would observe in the exercise of his
perpetua). These Edicta were written on a wh
(album) in black letters; the headings or titles we
the Alba were placed in the Forum, in such a p
they could be read by a stander-by. Those Edi
related to the administration of justice had an impor
on the Roman law; and especially the Praetoria
those of the Curule Aediles. That branch of law
founded on the Praetorian Edicta was designated
torium, or Honorarium, because the Praetor held o
offices to which the term Honores was applied.
were only in force during the term of office of th
tus who promulgated them; but his successor ad
or all of his predecessor's Edicta, and hence arose
sion of 'transferred edicts' (tralaticia edicta); and
later Republic the Edicta which had been long
began to exercise a great influence on the law, a
larly on the forms of procedure. About the tim
many distinguished jurists began to write treat
Edictum (libri ad edictum). Under the Emperors
were rarer, and in the third century of our aera
Under the Empire we first find the Edicta of the
Urbi mentioned; but these must be considered as
the Imperial authority (majestas principis), and
sembled the Imperial Constitutions. Under th
Hadrian, a compilation was made by his autho
Edictal rules by the distinguished jurist Salvius J
conjunction with Servius Cornelius, which is spok
the name of Edictum perpetuum. This Edictum w
under various heads or titles, such as those relati
riage, Tutores, Legata (legacies), and so on.

By the term Praetorian Edict the Romans meant
of the Praetor Urbanus, who was the chief pers
ployed in the higher administration of justice und
public. The Edicta which related to Peregrini (a
so named after the Praetor Peregrinus; and ed
were called Censoria, Consularia, Aedilicia, and so
times an Edict of importance took its name from
who promulgated it, as Carbonianum Edictum.
the Honorariae actiones, those which the Praet
Edict permitted, were named in like manner from th
who introduced them. Sometimes an Edict had
from the matter to which it referred. The Rom
rally cited the Edicta by parts, titles, chapters, or
the Edictum Perpetuum by naming the initial word
Legitimi, and so on; sometimes they are cited by a
to their contents. Examples of these modes of
Edictum occur in the titles of the forty-third b
'Digest.' (See the title 'Quorum Bonorum.')
law we refer to certain forms of proceedings and
actions in a like way, as when we say Quo Warran
Impedit, and speak of Qui tam actions.

The Jus Praetorium is defined by Papinian (*Dig.*
as the law which the Praetors introduced for the
aiding, supplying, or correcting the law (jus civile
view to the public interest. The edict is called h
nus 'the living voice of the jus civile,' that is, of
law. (*Dig.* i. tit. i. 8.) The Praetorian Law
formed (Jus Praetorium), was a body of law whic
tinguished by this name from the Jus Civile, or
law; the opposition resembled that of the Engl
Equity and Law. In its complete and large sense
Romanorum, or the Law of the Romans, of cours

nded the Jus Praetorium; but in its narrower sense Jus vile was contrasted, as already explained, with the Jus actorium.

The origin of the Roman edictal Law is plainly to be ced to the imperfections of the old Jus Civile, and to the cessity of gradually modifying law and procedure accord- to the changing circumstances of the times. It was an ier method of doing this than by direct legislation. Nu- rous modern treatises contain a view of the origin and ure of the Roman Jus Praetorium, though on some points e is not complete uniformity of opinion.

öcking, *Institutionen*, vol. i.; Puchta, *Cursus der Institionen*, vol. i. p. 293; Savigny, *Geschichte des Röm. ts*, vol. i.; Heffter, *Die Oeconomie des Edictes, Rhein. für Juris.* i. p. 51; E. Schrader, *Die Prätorischen te der Römer*, 1815.)

WARDS, RICHARD, one of our earliest dramatic s, was born in Somersetshire in 1523. He was edu- at Oxford, in Corpus Christi College, where he was sively a scholar and fellow: he took his degree of Master s in 1547. Removing to Lincoln's Inn, he was made, beginning of Elizabeth's reign, one of the gentlemen Queen's Chapel, and master of the children there, a hich engaged him in theatrical management. He is ard of as a dramatic poet in the year 1564-5; and his is said to have taken place in 1566. Although he is y commended for his dramatic works by Puttenham (no competent judge), who sets him down as one of the two writers in comedy and interlude, we learn the names of ore than two of his dramas. One of these, 'Palamon and te,' was never printed, and is lost: the other, 'The ex- nt comedie of two the moste faithfullest freendes Damon Pithias,' was printed in a black-letter 4to. in 1571, again, ack-letter, 4to. 1582, and is included in the first volume odsley's 'Old Plays.' Edwards also wrote some of the s inserted in 'The Paradise of Dainty Devises,' 1575, nted in the 'British Bibliographer,' and a death-bed , called 'Edwards' Soul-Knell.' His name is interest- s belonging to one of the rude founders of our drama; his surviving play, in its inartificial structure and un- ical and undramatic details, offers little that can attract but the student of literary antiquity. 'The serious por- ,' says Mr. Collier very justly, 'are unvaried and heavy, the lighter scenes grotesque without being humorous.'

FT. The terms *Eft* and *Newt* are applied almost in- iminately to all the species of lizards which are found in British Islands. The word lizard is evidently formed lacerta, and is comparatively modern. Eft and Newt the old Saxon words. Eft seems to be more usually lied to the land animals, one of the most common of ch is the *zootoca vivipara*, and another less common, the *ta agilis*, both of which are described in the article ANIDÆ, P. C., pp. 132, 133. Newt is more commonly lied to the animals which inhabit ponds, wet ditches, and r damp places, such as the *triton cristatus* (the great water-), *lissotriton punctatus* (the common smooth newt), and species, of which a description is given under SALA- DRIDÆ, P. C., pp. 332-336; and also in the *Penny azine* for 1843, p. 97 (No. 703).

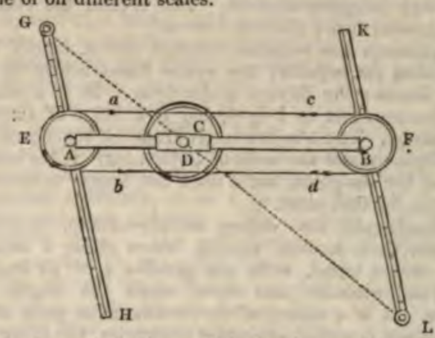
G-TRADE. In 1835 the value of eggs exported from d to Great Britain was 68,687*l.*; and perhaps at the nt time it may exceed 100,000*l.* At 4*d.* per dozen the er of eggs which this sum would purchase would be 0,000. From France and Belgium we imported 0,000 eggs in 1840; on which the duty of one penny ozen produced 34,450*l.* Nine-tenths of the foreign eggs rom France. The departments nearest to England, from Pas de Calais to La Manche, are visited by the dealers, their purchases often produce a scarcity in the country ets. At most of the ports of these departments, from is to Cherbourg, some vessels are employed in the egg- . The weight of 80,000,000 eggs is not far short of tons. In the last three years the importations of foreign were as follow:—

1842 . . .	89,548,747
1843 . . .	70,415,931
1844 . . .	67,487,920

he consumption of eggs at Paris is estimated at one hun- millions of eggs a year.

GRA, a locality in Bohemia, famous for fossil Infusoria, cially Campilodiscus, which comprises nearly the whole e white pulverulent mass. (Mantell, *Medals of Creation*, 223.)

EIDOGRAPH, from the Greek words *εἶδος*, a form, and *γράφω*, draw, is an instrument invented in the year 1821, by the late Professor Wallace of Edinburgh, and described in the 'Transactions of the Royal Society of Edinburgh,' vol. xiii. It is a species of pantograph, and, like the latter, it is used for the purpose of copying plans or other drawings on the same or on different scales.



A rod or beam AB of brass, 30 inches long and five-eighths of an inch square, and made hollow for the sake of being light, slides freely through a hollow rectangular socket C, whose length is 4½ inches; from the lower surface of this socket projects a steel pin of a conical form, and serving as an axis; the pin entering into a tube of a corresponding form which stands vertically on a cylindrical mass D of metal. The mass serves as a base for the whole instrument; and while the beam AB may slide horizontally in the socket C, it is capable of turning with the socket upon the vertical axis in the tube. Each end of the beam AB carries a short tube in a vertical position, and through this passes the conical axle of a wheel or pulley E or F, which is placed below the beam: these wheels are precisely equal in diameter, and are capable of turning freely on their centres in a horizontal plane.

The vertical edge of each of these wheels is grooved so as to receive a piece of very thin watch-spring *a* E *b*, *c* F *d*; and the ends *a* and *c*, *b* and *d* are connected by a steel wire; the pieces of watch-spring are made fast near E and F to the circumferences of the wheels in order to prevent them from slipping on those circumferences; a small movement for the sake of adjustment only being allowed. Swivel screws at *c* and *d* serve to tighten or relax the band as may be necessary.

Under each of the wheels E, F, is fixed a rectangular socket similar to C, and in this slides, horizontally, a rectangular arm G H, K L, each of which is 27½ inches long: these arms, which turn with the wheels E and F, are adjusted by means of the screws at *c* and *d*, so as to be always parallel to one another. At L is fixed a tracing point, like that of a pantograph; and at G a pencil in a socket or tube; the tracer and pencil are to be always in a straight line, passing through the common axis of the mass D, and of the socket C. The pencil is made to press gently on the paper by weights, but it is capable of being raised from thence at pleasure by means of a lever, one end of which is connected with the socket which carries it, and to the other is attached a string which is to be pulled by the operator when necessary: this movement of the pencil carrier is facilitated by means of small friction rollers.

The beam AB is divided on its upper face in 100 or 1000 equal parts, and divisions equal to these are set on the upper face of each arm GH, KL. By these divisions the distances of A and B from the axis of D may have any given ratio to one another, and AG, BL may respectively be made equal to the last-mentioned distances. Thus, the isosceles triangles GAD, DBL will always be similar to one another; and the figure described by the movement of the pencil at G will be similar to the original figure over which the tracer at L may be made to pass. Consequently, a given plan or drawing may be enlarged or reduced in any required proportion.

Professor Wallace contrived an instrument which he called a 'Chorograph,' for describing on paper any triangle, having one side and all its angles given; also for constructing two similar triangles on two given straight lines, having the angles given. See 'Geometrical Theorems,' &c. By William Wallace, LL.D. Edinburgh, 1839.

ELÆODENDRON. (From ἐλαία, an olive, and δένδρον, a tree). A genus of plants belonging to the natural order Celastracæ. It has a 5-parted calyx; 5 expanding linear-oblong petals; a five-angled very thick fleshy disk; 5 anthers:

inserted into the margin of the disk; the filaments at length recurved; anthers with a thick connective, roundish, opening longitudinally; the ovary immersed in the disk, 2-celled; the ovules 2 in each cell; the style short, conical; the stigma simple, obtuse; the fruit drupaceous, dry, or pulpy; the nut 1-2 celled; the seeds usually solitary, with a membranaceous or spongy integument erect. The species are small trees with opposite entire glabrous leaves.

E. glaucum has elliptical serrated leaves, hardly 3 times longer than the petioles; the cymes loose, nearly the length of the leaves; the flowers pentandrous. It is a small tree, about fourteen feet in height, and is a native of Ceylon and Coromandel. The tree has been introduced into Great Britain from Ceylon under the name of Ceylon-tea. It has leaves like those of the tea-plant, but it does not appear to be used as a substitute for that plant.

E. Roxburghii has oblong serrato-crenate, opposite and alternate, hard, smooth, shining leaves about 4 inches long and 2 inches broad, with the petioles ¾ of an inch long: the cymes globular, and three times the length of the petioles. It is a native of the mountainous parts of India. It possesses powerful astringent properties, but is not used as an internal medicine.

The fruit of all the species resembles that of the olive, and hence the generic name. *E. orientale* is a native of the Mauritius and Madagascar, where it is called by the French *Bois d'Olive*. *E. Argam* contains in its fruit a fixed oil like the common olive, which is used by the Moors for the same purpose as olive oil is used in Europe.

The species of Elæodendron will grow freely in a mixture of loam and peat, and ripened cuttings will root in sand under a hand-glass.

(Lindley, *Flora Medica*; Loudon, *Encyclopædia of Plants*; Don, *Gardener's Dictionary*.)

ELA'PHRIUM. [CALOPHYLLUM, P. C. S.]

ELA'SMODUS, a genus of fossil Placoid fishes, from the London clay. (Egerton.)

ELASTIC BANDS, in Machinery. [WHEELS, P. C., p. 312; CAOUTCHOUC, P. C. S., p. 283.]

ELATERIN. [CHEMISTRY, P. C. S.]

ELATINA'CEÆ, a natural order of plants belonging to Lindley's Calycose group of polypetalous Exogens. The sepals are 3-5, distinct or slightly connate at the base; the petals hypogynous, alternate with the sepals; the stamens hypogynous, usually twice as numerous as the petals; the ovary with from 3 to 5 cells, an equal number of styles, and capitate stigmas; the fruit capsular, 3-5 celled, with the valves alternate with the septa, which usually adhere to a central axis; the seeds numerous, with a straight embryo, whose radicle is turned to the hilum, and little albumen. The species belonging to this order are annual plants with fistulous rooting stems, and opposite stipulate leaves, inhabitants of marshy places.

This order is nearly allied to Caryophylleæ, from which it has been separated by Cambessedes, on account of the different organization of the seeds, capsules, and stigmas. It agrees with Hypericaceæ in many points, and especially in possessing receptacles for resinous secretions, but differs in having a persistent central axis in the fruit, definite stamens, and so forth. The species are found in marshy places and under water in all parts of the globe. Cambessedes arranged three genera in this order:

1. *Merimæa* (named in honour of Prospero Merimes, an old botanist), with a 5-parted calyx; 5 petals; 10 stamens; 5 styles; a 5-valved, 5-celled, many-seeded capsule, the valves separating, and bent in at the margins so as to constitute dissepiments. This is a South American genus, of which but one species, the *M. arenarioides*, a native of Brazil, has been described.

2. *Bergia* (after Peter Jonas Bergius, professor of natural history at Stockholm, and author of several works on botany), with a 5-parted calyx; 5 petals; 5 styles approximate; the capsule 5-valved, 5-celled from the edges of the cell being bent inwards. There are four species; one is a native of Egypt, one of Java, one of the East Indies, and one of the Cape of Good Hope.

3. *Elatine*, with a calyx 3-4 parted; 3-4 petals; 3-4 or 6-8 stamens; 3-4 styles; the capsules 3-4 celled, many-seeded, the seeds cylindrical, terete, straight, or bent. There are five species of this genus.

E. Hydropiper, water-pepper, has opposite leaves shorter than their petioles, the flowers stalked or nearly sessile, with 8 stamens and 4 ovate petals; the capsule roundish, depressed,
4-celled, the seeds bent almost double, pendulous, 4
cell. It has rose-coloured flowers. It grows unde
and is very common in ground subject to inundations
out France. It is a very rare plant in Great Britain,
been found only in Wales and Ireland. *E. hexandra*
nute plant having 6 stamens. It forms small matted
water, and is common in France but rare in Great
E. tripetala, of Smith is identical with this species.
dra has been found in the neighbourhood of Ratis
alsinastrum is found near Paris.

(Don, *Gardener's Dictionary*; Babington, *Brit.*

ELDER. [SAMBUCUS, P. C.]

ELDON, JOHN SCOTT, EARL OF, rose to
nent station which he ultimately held from
beginning. His family has been stated to
apparently a branch of the Scotts of Balwearie, in
which the famous Michael Scott, of the thirteenth
supposed to have belonged [P. C. xxi. 101]; but for
is no sort of evidence whatever. All that is known
ancestry is that his grandfather is reported by
have been a clerk in the office of a coal-fitter at
and a man of very good repute; he is described in
document, of the year 1716, as William Scott, of
(one of the streets of that town), yeoman. The
which he is so mentioned is the indenture by which
of the same names, was bound apprentice for the
of seven years, to a member of the Newcastle
hostmen, or ostmen, a name of disputed etymology,
appears to include different descriptions of dealers in
commodity of the place, coal. This Mr. William
father of Lord Eldon, followed the business of wha
a coal-fitter, defined by his son's biographer to be '
who conducts the sales between the owner and the
taking the shipper's order for the commodity, supp
cargo to him, and receiving from him the price of
owner.' In this line he prospered so much that at
at the age of seventy-nine, 6th November, 1776,
to have left to his family, including what some of
previously received from him, property to the amo
tween thirty and forty thousand pounds.

Mr. William Scott was twice married. By his
Isabella Noble, who died January, 1734, he had
dren, all of whose descendants are extinct; by his
Jane Atkinson, daughter of Henry Atkinson,
Newcastle, whom he married in August, 1740,
thirteen children, of whom the eldest son, Willia
wards Lord Stowell, was born in 1745, and of wh
was the eighth. He was born in 1751—as he
on the 4th of June—at his father's house in Love-l
castle, the site of which is now partly occupied
smaller houses, partly taken in to widen Forster St
is said to have one day stated in the Court of Cha
he was born in a chare-foot, as the lower extremities
lanes or chares are called.

John Scott was educated, with his elder brother
and Henry, at the royal grammar school of his na
commonly called the Head School, where the head
the Rev. Hugh Moises, a respectable scholar and an
teacher, but one who did not spare the rod. Wil
to Oxford in 1761. [STOWELL, LORD, P. C. S.] It
father's intention to bring up John to his own busi
when he was making arrangements for that purpose
William wrote home from Oxford advising that he
sent up to him; 'I can,' he said, 'do better for him h
cordingly, on the 15th of May of that year, he was
commoner of University College. On the 11th of J
he was elected to a fellowship in his college, having
completed his sixteenth year; he took his bachelor
20th February, 1770; gained, in 1771, the chancell
of 20*l.* for an English prose essay on 'The Advant
Disadvantages of Foreign Travel' (published in '
Collection of the Oxford English Prize Essays,' 18
forfeited his fellowship by running off, on the 18th
vember, 1772, with Miss Elizabeth Surtees, dau
Aubone Surtees, Esq., banker, of Newcastle, whom
ried at Blackshiels in Scotland, the next day. T
father was very angry; and it was some little time
was reconciled; but at last he agreed to give his d
portion of 1000*l.*, Mr. Scott making over to his son
sum. Meanwhile, it is said, a grocer of Newcastle,
of the family, who was well to do in the world, ha
offered to take the young man into partnership;
was only another interference of his elder brother

ented the father from closing with this proposal.
determined that he should enter into holy orders
sity College living fell vacant during the twelve
grace, as they are called, for which he was still
hold his fellowship; that event did not happen,
made up his mind, it is said with some reluctance,
rofession of the law. He had entered himself a
he Middle Temple in January, 1773; and he took
of master of arts on the 13th of February in the
If these dates, which we take from Twiss's
d Eldon, and which are there supported by docu-
idence, be correct, it will follow that there is an
in Lord Eldon's own statement therein quoted (vol.
om what is called his Anecdote Book, according
e is made to have given up 'the purpose of taking
ore entering himself as a student at the Temple.
remarks, indeed, that his relinquishment of the
aking orders was at this time 'but inchoate.'

he years 1774 and 1775 he held the office of a
iversity College, where his brother William was
senior tutor; but it is believed that all he did in
y was to attend to the law studies of some of the
f the college. He received none of the emolu-
e office. One or both of these years also he read
tures, as deputy for Sir Robert Chambers, the
ofessor; and for this service he had 60*l*. a year.
enough, the first lecture he had to read was upon
4 & 5 Phil. and M., c. 8, 'Of young men running
naidens;' and it so chanced that he had to deliver
ely after it was put into his hands, and without
word that was in it. 'Fancy me reading,' he said,
g the story long afterwards, 'with about one hun-
orty boys all giggling at the professor. Such a
lience no one ever had.'

t was called to the bar on the 9th of February,
ich he came up with his wife to London, and took
se in Cursitor Street, from which he soon after
another in Carey Street. He naturally joined the
ircuit; but it was, as usual, some time before he
ke much by his practice. Indeed after a trial of
e years his prospects of success in London seemed
ing, that he had made arrangements for settling as
counsel in his native town, when, in July, 1788,
ght into considerable notice by his argument in the
kroyd *v.* Smithson (1 Bro. C. C. 503), heard before
Sewell, Master of the Rolls; and into still more
homas's judgment, which was adverse to his client,
d in March, 1780, by Lord Chancellor Thurlow, in
with Scott's reasoning, which has decided all simi-
s ever since. The question was what should be
ne of a number of shares into which a testator had
t the money obtained by the sale of his real estates
ivided, the party to whom he had given the share
having died in the testator's lifetime. Mr. Scott
hat the share, being land, at the death of the tes-
o the heir-at-law. Even for some time after this
ever he still retained the idea of settling in New-
had actually made a house be taken for him in that
ich he had also accepted the Recordership. One
ently 1780, he did not go the circuit, because he
ford it; he had already, to use his own words, bor-
s brother for several circuits, without getting ade-
eration. But when matters were in this state he
y found such an opportunity of distinguishing him-
ection case (that of Clitheroe) before a committee
e of Commons as at once changed his position,
at his plans for the future. Having been applied
sence of the counsel who was to have led, Mr.
the refusal of the next counsel to lead because he
pared, was persuaded to take the conduct of the
w hours' notice. It lasted for fifteen days. 'It
oor enough,' said he, relating the circumstances in
'but I began to be rich before it was done: they
y guineas at the beginning; then there were ten
ry day, and five guineas every evening for a con-
nore money than I could count. But, better still,
f the cause gave me time to make myself tho-
quainted with the law.' He was beaten in the
y one vote; but the ability he had shown did not
blish his reputation.

ght of leaving London was now abandoned; his
n this time increased rapidly; and in June, 1783,
ation of the coalition ministry of Lord North and
Mr. Fox, and the great seal on Lord Thurlow's resignation being put into commission, he was one of several junior counsel who were called within the bar. Erskine was another; and it was at first intended to give precedence to him and Mr. Pigott, both of whom were Scott's juniors; but to this arrangement the latter firmly refused to submit; and his patent, as ultimately drawn out, gave him precedence next after the king's counsel then being, and after Harry Peckham, who had been made one a few days previously, and had been placed before Erskine, though Erskine's patent was of earlier date. A few days after he received this promotion, he was, as is customary, made a bencher of his Inn of Court.

About the same time he was returned to parliament for the borough of Weobly, through the patronage of Lord Weymouth, with whom however he stipulated that he should not be expected uniformly, or as a matter of course, to represent his lordship's opinions. The election took place on the 16th of June. He and Erskine both made their maiden speeches in the same debate, that on the 20th of November, about a week after the opening of the session, on a motion connected with the famous India bill, which eventually upset Fox's government. The two young lawyers were however on opposite sides—Erskine with ministers, Scott with Pitt and the party destined soon after to come into power. The Coalition ministry was turned out on the 18th of December; and on the 24th of March, 1784, the king prorogued, and the next day dissolved, parliament, after the opposition to Pitt and the new government had been gradually brought down in the course of a long series of divisions to a majority of one. Mr. Scott was again returned for Weobly; and in the new parliament he took a prominent part in most of the legal questions that came before the House. In the session of 1785, on the 9th of March, he spoke and voted with Fox against ministers on one of the questions connected with the great Westminster scrutiny; and his speech was considered to have established the doctrine 'that the election must be *finally* closed before the return of the writ, and that the writ must be returned on or before the day specified in it.' This principle the government soon after consented to enact as law by the statute 25 Geo. III. c. 84, 'To limit the duration of polls and scrutinies.'

In March, 1787, Mr. Scott was appointed chancellor of the bishopric and county palatine of Durham, by the bishop, who was a brother of Lord Thurlow, and had just been translated to the see. In June, 1788, on Lord Mansfield's resignation and the appointment of Sir Lloyd Kenyon as his successor in the chief-justiceship of the King's Bench, the attorney-general, Mr. Pepper Arden, was made master of the rolls, in room of Kenyon; the solicitor-general, Sir Archibald Macdonald, became attorney-general; and the office of solicitor-general was conferred on Scott. At the same time he was also knighted. A few days afterwards he was re-elected for Weobly; and he was a fourth time returned for the same place to the new parliament which met in November, 1790. He held the office of solicitor-general till February, 1793, when he was made attorney-general on the promotion of Sir Alexander Macdonald to the place of Chief Baron of the Exchequer. On this occasion he was returned a fifth time for Weobly. To the next parliament, which met in September, 1796, the last in which he sat as a member of the House of Commons, he was returned, along with Sir Francis Burdett, for the Duke of Newcastle's borough of Boroughbridge.

The period of Sir John Scott's tenure of the office of attorney-general extends to the year 1799. It is memorable for the state trials connected with the political excitement produced in this country by the breaking out of the French Revolution. Muir, Palmer, Skirving, Margarot, and Gerald, had all been convicted of sedition in Scotland, and sentenced to fourteen years' transportation, when in October, 1794, Hardy, Horne Tooke, Thelwall, Holcroft, and their associates, were indicted for high treason at the Old Bailey. Only Hardy, Tooke, and Thelwall were tried; all three were acquitted; and the prosecutions against the other prisoners were dropped. There has been much difference of opinion as to the wisdom of the course taken by the government on this occasion, but perhaps too much stress has commonly been laid on the single fact that none of the trials issued in a conviction. There can be no doubt that the evidence, although it was held insufficient to support the charge of high treason, produced an immense effect upon the public mind; and the accused were dismissed from the bar unharmed, but to a great extent disarmed. The attorney-general naturally came in for a principal share of the obloquy which the proceedings excited; but his demeanour in the conduct of the trials was admitted on all hands to have been characterised by moderation and good temper. His answer to the question so often asked,—Why he had not prosecuted for a misdemeanour? always was, that in his deliberate opinion the offence was treason or nothing; but he never could get over the next question, How could any one expect a jury to convict of treason, when it required a speech of eleven hours to state the charge? In his own written account however, as quoted by Mr. Twiss from the 'Anecdote-Book,' vol. i. pp. 282-286, he lays the principal stress upon the desirableness of bringing out all the evidence. His words are, 'The mass of evidence, in my judgment, was such as ought to go to the jury for their opinion, whether they were guilty or not guilty of treason. Unless the whole evidence was laid before the jury, it would have been impossible that the country could ever have been made fully acquainted with the danger to which it was exposed; . . . . . and it appeared to me to be more essential to securing the public safety that the whole of their transactions should be published, than that any of these individuals should be convicted.'

In July, 1799, on the death of Sir James Eyre, Chief Justice of the Common Pleas, Sir John Scott claimed and obtained that office, agreeing at the same time to go into the House of Lords. His title of Baron Eldon was taken from a manor of that name, consisting of above 1300 acres, in the county of Durham, which he had purchased for 22,000*l.* in 1792. It appears from Lord Eldon's fee books, as far as they have been preserved, that his annual receipts when at the bar had been in 1785, 6054*l.*; in 1786, 6833*l.*; in 1787, 7600*l.*; in 1788, 8419*l.*; in 1789, 9559*l.*; in 1790, 9684*l.*; in 1791, 10,213*l.*; in 1792, 9080*l.*; in 1793, 10,330*l.*; in 1794, 11,592*l.*; in 1795, 11,149*l.*; in 1796, 12,140*l.*; in 1797, 10,861*l.*; and in 1798, 10,557*l.* His removal to the bench was a great sacrifice of income, but he considered that his health and comfort required his retirement from the laborious office of attorney-general. His claim however was at first opposed by both Pitt and Loughborough the chancellor, both of whom were desirous of giving the office to Sir R. Pepper Arden, then Master of the Rolls.

When it became known that Sir John Scott was to be the new Chief Justice of the Common Pleas, Lord Kenyon, then Chief Justice of the King's Bench, publicly congratulated the profession on the appointment of one, who, he said, would probably be found 'the most consummate judge that ever sate in judgment.' And Lord Eldon proved an admirable common law judge. 'On the bench of a common law court,' it is remarked by his biographer, 'no scope was allowed to his only judicial imperfection, the tendency to hesitate. . . . Compelled to decide without postponement, Lord Eldon at once established the highest judicial reputation; a reputation, indeed, which afterwards wrought somewhat disadvantageously against himself when lord chancellor, by showing how little ground there was for his diffidence, and consequently how little necessity for his doubts and delays.' He was also much attached to his office, and to the end of his life used to express the strong regret with which he had left the Court of Common Pleas.

But on Lord Loughborough's resignation of the Great Seal in April, 1801, about a month after Mr. Pitt had been succeeded as prime minister by Mr. Addington, Lord Eldon became lord chancellor (14th April). His own account was that when he was made Chief Justice of the Common Pleas, the king had insisted upon his giving a promise, that, whenever he should call upon him to take the office of chancellor, he would do so. He continued to hold this office till the 7th of February, 1806, when, on the accession of the Whig ministry of Mr. Fox and Lord Grenville, he was succeeded by Lord Erskine; he resumed it on the 1st of April, 1807, on the return of his party to power; and he finally resigned it on the 30th of April, 1827, when Mr. Canning became prime minister, and the Great Seal was given to Lord Lyndhurst. He was raised to the dignities of Viscount Encombe and Earl of Eldon in 1821.

Lord Eldon's judicial character has been elaborately drawn by several competent pens. The reader may be especially referred to the volumes of his biographer, Mr. Twiss; to a series of articles in the 'Law Magazine,' Nos. 41 to 44 inclusive; and to the Second Series of Lord Brougham's 'Historical Sketches of Statesmen who flourished in the time of George III.' It is admitted on all hands that in legal learning he never had a superior, if he had an equal, in Westminster Hall; and, although his intellect was not capa
his general powers of mind of a commanding
the acuteness and subtlety with which he applied
fessional knowledge he was perhaps unrivalled by
that ever sat upon the bench. The great fault
puted to him is the hesitation which he showed in
a decision, or at any rate, as has been said to have
the case, in pronouncing one. But this habit, how
tressing to individual suitors, was not so permanently
vous as might be feared. Indeed the anxious consider
which his judgments were formed enhances their
authority.

During nearly all the time that Lord Eldon
woolsack he took a leading part in the general deba
House of Lords; he was also understood to be
most influential members of the cabinet; and he wa
one of the staunchest and most uncompromising sup
all the great principles of the old Tory or Conserva
The two great measures of Parliamentary Reform a
Catholic Emancipation in particular were steadily o
him on all occasions, and to the last. Indeed it w
flexibility on the latter of these two questions that
his final retirement from office.

Opinions will of course be divided on Lord El
racter as a public man. The facts of his long care
generally known; and sufficient time has elapsed
the present generation to form a tolerably correct
the men who directed affairs in the eventful period of
part of the reign of George III. and the Regency.
we may affirm without incurring the imputation of
a mere party spirit; that the reputation of Lord
profound lawyer will be permanent, while his
statesman was not marked by any measure that
among the great men of his age or country.

Lord Eldon survived in retirement till the 13th of
1838, and was succeeded in his peerage by his gra
present earl, the son of his eldest son John, who
at Oxford, 8th March, 1774, and died 24th
1805; having married on the 22nd of August, 1
rietta Elizabeth, daughter of Sir Matthew Whit
Bart., who after her first husband's death became
James William Farrer, of Ingleborough, Yorkshire,
one of the Masters in Chancery. Lord Eldon's othe
were Elizabeth, born in 1783, who married Geor
Repton, Esq.; Edward William, born in 1791, a
John, born in 1793, who doth died in infancy;
Henry John, born in 1795, who died in 1832; Fra
born in 1798, who married the Rev. Edward Bank
of Corfe-Castle, and Prebendary of Gloucester and
and died in 1838. Lady Eldon died in 1831.

(*The Public and Private Life of Lord Chancell*
with Selections from his Correspondence, by Hor
Esq., one of her Majesty's Counsel, 3 vols. 8vo., L

ELECTION-COMMITTEES. The course of
of members of the House of Commons from the iss
writs to the returns made to the Clerk of the Crown
sketched in the article House of Commons, P. C.
of the Crown certifies the returns made to him to t
[Clerk of the Crown, P. C. S.] This mode of a
election-petitions is the subject of the present article

Till 1770, when the act well known as the Gr
was passed, questions of controverted elections we
by the whole House of Commons: and every such
was made a party contest. The Grenville act in
plan, which, with several modifications, continued
of appointing committees for the trial of election p
lot. Since 1839 a different system has been in
under which the choice of members of election-com
not been left to chance, and their individual respons
been increased by diminishing the number of mem
the 7 & 8 Vict. c. 103 (passed last year, 1844), th
of members of an election-committee was reduced f
to five, including the chairman.

The 7 & 8 Vict. c. 103, now regulates the constit
the proceedings of committees on controverted elect

At the commencement of every session, the Sp
points by warrant six members of the House to be a
Committee of Elections. The General Committee
tions, when appointed, proceed to select, 'in their d
six, eight, ten, or twelve members, whom they s
duly qualified, to serve as chairmen of election-com
and the members so selected for chairmen are for
separate panel, called the Chairmen's Panel. The

General Committee of Elections are excused from g as members of election committees, and all members House of Commons above the age of sixty are also ex- from this service. The House also allows other special ds of exemption; the principal ministers for instance cused from serving on election-committees, so long as hold their offices, on account of their official duties. the General Committee of Elections have appointed the men's Panel, they divide the remaining members of the e who are not exempted from service, into five panels; members are chosen to serve on elections from these s, in an order of succession determined by lot. All on-petitions are referred by the House to the General ittee of Elections; and this General Committee give e, as provided by the act, of the days on which particular on-committees will be appointed, and of the panel from h members will be taken. 'The General Committee meet at the time appointed for choosing the committee any election-petition, and shall choose from the panel standing next in order of service, exclusive of the chair- panel, four members, not being then excused or dis- fied for any of the causes aforesaid, and who shall not be lly disqualified for being appointed on the committee to ch petition for any of the following causes: that is to y reason of having voted at the election, or by reason ng the party on whose behalf the seat is claimed, or to the sitting member or party on whose behalf the claimed by kindred or affinity in the first or second , according to the canon law.' (§ 55.) At least four rs of the general committee must agree in the appoint- On the same day on which the general committee the members of an election-committee, the chairmen's hoose from themselves a chairman for the committee, mmunicate the name of the chairman selected to the committee. The names of the chairman and mem- lected are thus communicated to the petitioners and member or members, who may object to any of the rs on any ground of disqualification specified in the ection of the act, but on no other ground. If any r is shown to be disqualified, the general committee another; or if the chairman is disqualified, they send is name to the chairmen's panel, who proceed to choose chairman. The five members finally chosen are after- sworn at the table of the House 'well and truly to try tter of the petitions referred to them, and a true judg- to give according to the evidence.'

h is a general sketch of the present mode of constitution tion-committees. For other details the reader must refer act itself, or to Mr. May's 'Treatise on the Law, Pri- s, Proceedings, and Usage of Parliament,' pp. 341-373. a matter of practice for the General Committee of ions to take the four members of an election committee y from the two sides of the House.

e second section of the act defines election-petitions, and fies by whom they must be signed. Election-petitions etitions complaining, 1, of an undue election; or, 2, no return has been made to a writ on or before the day hich the writ was returnable; or, 3, if the writ be issued g any session or prorogation of Parliament, that no re- has been made within fifty-two days after the date of the ; or 4, that a return is not according to the requisition of rit; or, 5, of special matters contained in the writ: and must be signed by some person claiming therein to have a right to vote at the election, or to have had a right to turned, or alleging himself to have been a candidate at lection.

ll election-committees are empowered to send for per- , papers, and records, and to examine any one who may signed the petition, unless it shall appear that he is an ested witness, and to examine all witnesses upon oath, ch is to be administered by the clerk attending the com- ee. Election-committees are the only committees of the se of Commons in which evidence is taken upon oath. one giving false evidence is made liable to the penalties lful and corrupt perjury.

rties complaining of or defending a return are required liver in to the clerk of the General Committee of Elec- lists of the voters intended to be objected to, with the al heads of objections, not later than six in the afternoon e sixth day next before the day appointed for choosing ommittee to try the petition; and the election-commit- annot enter into evidence against any vote, or upon any of objection, not included in the lists.

The committee are required to decide 'whether the petitioners or the sitting members, or either of them, be duly returned or elected, or whether the election be void, or whether a new writ ought to issue.' Their decision on these points is final between the parties: and the House carries it into execution.

ELECTION OF MEMBERS OF PARLIAMENT. [PARLIAMENT, P. C.]

ELECTRIC TELEGRAPH. [TELEGRAPH, ELECTRIC, P. C. S.]

ELECTRICITY, ATMOSPHERIC. The similarity of lightning to the spark obtained by friction from an electrical apparatus was observed by the earliest experimenters in electricity; and in one of Franklin's letters, written apparently before the year 1750, the points of resemblance are distinctly stated. The first fruit of this discovery was the employment of thunder-rods for the protection of buildings and ships; and rods or wires projecting above the tops of edifices were soon extensively used by philosophers for the purpose of enabling them to ascertain the nature and intensity of the electricity in the atmosphere. Such means are not unattended by danger; and science has to record the death of Professor Richman, during a thunder-storm, while attending to the indications of the electrometer connected with an apparatus of that kind. [LIGHTNING, P. C.]

Franklin in America, M. de Romas in France, and Cavallo in England, each employed, for the purpose of bringing electricity from the atmosphere to the surface of the earth, a kite made of silk stretched on a frame, from the upper part of which projected a piece of pointed metal, and from which proceeded along the string a slender metallic wire. M. Buffon, M. Lemonnier, and others, planted vertically in the ground poles, from 30 to 40 feet in height, carrying at the top a pointed piece of tin or iron, from which descended a metallic wire. M. Mézèas in France, Mr. Ronayne in Ireland, and Mr. Crosse in England, employed long wires in horizontal positions, which were insulated by being stretched between two glass pillars, each on the top of a pole planted in the ground. The wire used by Mr. Crosse is 1800 feet long, and is above 100 feet from the ground.

The numerous experiments made by Cavallo serve to prove that the electric fluid always exists in the atmosphere, but in very different quantities at different times, and that it is more abundant in the higher regions than near the earth. The same philosopher found, also, that it is more intense in frosty than in warm weather, and that fogs are accompanied by a great quantity of electricity, except when they become rain; in this case, little electricity is perceptible, the rain conducting to the earth the electricity of the air above. In high winds, also, the intensity of the atmospherical electricity is generally diminished, probably because the strata of air containing different quantities of the fluid are brought successively to the ground, and thus there is produced a nearly uniform distribution of the fluid between the earth and atmosphere. It may be easily conceived that, in stormy weather, the variations of the atmospherical electricity will be very irregular; for currents of air in the upper regions, driving the strata of clouds in different directions, the electrical actions between the clouds and the atmosphere below must be extremely complex.

M. de Saussure has observed that, during summer and winter, by night as well as by day, when the atmosphere is free from clouds, the electricity of the air is positive; and Mr. Read (*Phil. Trans.*, 1794) has shown that out of 404 observations made in one year, the air was positively electrical in 241, negatively in 156, and that the electricity was insensible in 7 observations only. It seems probable, in fact, that the negative electricity which may be observed in a pure atmosphere is caused by the discharge of its positive electricity into the earth or a cloud, when one or the other of these is in a contrary state. Mr. Ronayne, however, states (*Phil. Trans.*, 1772) that, in Ireland, the electricity of the atmosphere is positive in winter when the air is clear: he observes that it diminishes in frosty or foggy weather, and that he could detect no electricity in the air during the summer except when a fog came on; the electricity was then positive, but it was less intense than during the winter fogs. It was an observation of Saussure that electricity is strongest in the open air; and that it is weak in streets, in houses, and under trees. In close rooms and hospitals, the electricity of the air has been always found to be negative; such also is the electricity of the atmosphere when it is vitiated by exhalations from lime, p and decaying vegetables.

All observations concur in showing diurnal variations in the intensity of atmospherical electricity, but there is some uncertainty concerning the precise times at which the intensities are the greatest and the least. Cavallo observed that, in dry weather, the electricity was weakest at sunrise; that it attained the maximum of strength in the day-time, and continued in that state till sunset, when the intensity diminished; he conceived that this diminution was much more rapid as the air became more humid; and he observed that, in winter, when a dry wind prevailed, if the sky were free from clouds, the electricity became very strong after sunset. M. de Saussure observed, at Geneva (1785) that, during winter, the intensity of atmospherical electricity attained its first maximum at 9 A.M.; that it diminished till 6 P.M., when it was in a minimum state; it afterwards increased, and attained its second maximum at 8 P.M.; after which it continued to diminish till it was again a minimum at 6 on the following morning. The same philosopher found that, in summer, the diurnal variations were less perceptible: on a dry warm day he found the electricity increase from sunrise, when it was almost insensible, till 3 or 4 P.M., when it became a maximum; it appeared then to diminish till the dew fell, when it became stronger, but it was scarcely sensible during the night. Lastly, the experiments of Mr. Read exhibit two maxima and two minima in twenty-four hours. The atmospherical electricity seemed strongest at 2 or 3 hours after sunrise, and again about sunset; it was weakest at noon and at 4 P.M.

The experiments of Mr. Crosse show also that, in the ordinary state of the atmosphere, the electricity is positive, and that it increases in proportion to the elevation above the earth's surface; the same philosopher observes that it is most intense at sunrise and sunset, and weakest at noon and during the night. He finds that the approach of a thundercloud produces a change in the electricity of the atmosphere, rendering it positive if it were before negative; and the contrary: whatever be the nature of the change which takes place, the intensity of the electricity increases to a certain degree; it then diminishes and disappears, and is succeeded by an opposite electricity: this gradually increases till it becomes of higher intensity than the former kind, and then it decreases till it vanishes: it is again succeeded by the first kind. These changes are often found to take place several times successively. Fogs, rain, snow, &c. also change the electricity from positive to negative, again from negative to positive, and so on; the change taking place every three or four minutes. A cold rain, in large drops, is frequently accompanied by intense electricity; and during a driving fog or rain the electricity is occasionally as strong as during a thunder-storm. A warm small rain is weakly electrified; and a weak positive electricity generally prevails during cloudy weather. Mr. Crosse finds also that the electricity of the air is very weak during the north-east winds, which in winter and spring times produce extreme cold and dryness.

The intensity of atmospherical electricity has been observed to undergo annual changes: it increases from July to November inclusive; so that the greatest intensity occurs in winter, and the least in summer.

Any of the different kinds of electrometer may be employed to determine the nature and intensity of atmospherical electricity. [ELECTROMETER, P. C.] The instrument proposed by M. Colladon of Geneva is formed of the wire employed as a galvanic multiplier; it consists of numerous coils well insulated from one another, and one end communicates with the earth while the other extends into the atmosphere. The energy and direction of the electric current is indicated by the deviation of a magnetized needle from the zero point of a scale.

The aurora borealis, and many other meteoric appearances have been ascribed to the electricity of the atmosphere. [AURORA BOREALIS, P. C.]

ELECTRICITY, CONDENSER OF. [CONDENSER OF ELECTRICITY, P. C. S.]

ELECTRICITY, DISTRIBUTION OF. [DISTRIBUTION OF ELECTRICITY, P. C. S.]

ELECTRO-METALLURGY. When a science, or the practical application of a science, is in rapid progress, it is difficult to embody the results in an alphabetical work like a Cyclopædia, since the subject may grow to increased importance immediately after a description has been given at a particular time. Such is the case with the arts depending on electric agency. When the articles ELECTRICITY, ELECTRO-CHEMISTRY, and GALVANISM, were published in P. C., little progress had been made in transferring from the le
to the workshop or the studio the wonderful pow
they relate; and although at a subsequent pe
matters were to some extent entered on in the t
VOLTAGRAPHY and VOLTAISM, P. C., it is still d
give here an account of a branch of art which h
very important within the last two or three years.

The object to be attained is, the deposition
metallic layer on the surface of some other body p
its reception; the outer layer being intended gen
not always) for one of three purposes—the deco
protection, or the imitation of that which lies bene
mode of proceeding assumes different forms, accor
purpose in view. The names *Electrotype, Galva*
tatype, Voltagraphy, Galvano-Plastics, Electro P
Gilding, all have been applied in a somewhat confu
to different modifications of the art; but we agree with
that it would be convenient to adopt the term *Ele*
lurgy as a general one, including all or most of the

Surface-Deposit, in Electro-Plating.—In the
manufacture of table-plate the articles are eithe
pure gold or silver, or have a surface of these costl
laid upon a foundation of cheaper metal; and it i
proved mode of applying the gold or silver that
process has been chiefly introduced. There have
in use various methods of applying a surface
a cheaper metal. For instance, polished steel
used formerly to be gilt in France by the following
The metal being heated, a thin leaf of gold was lai
burnished down; a second heating, a second app
gold, and a second burnishing succeeded; and the
tions were repeated until a sufficient body of gold
applied. Another method, that of 'water-gildin
most inappropriately named), consists in coating t
metal with an amalgam of mercury and gold, diss
mercury by means of heat, and leaving a bright gold
[BUTTON, P. C.; GILDING, P. C.] A later mode
by cleaning the metal article in an alkaline liquor,
it in a chemical solution of gold, by which a thin
precious metal becomes deposited on the foundation
But in the most usual mode of preparing silver
processes are rather mechanical than chemical:—
or ingot of mixed metal (copper and brass) with
ingot of silver laid upon it, is drawn through a r
by which the two are elongated and pressed togethe
sheet; and out of the sheet so prepared articles of
are made by stamping, punching, hammering, and
chanical processes.

The electro process differs from all of the above
first place, a designer sketches the pattern for the
from this pattern a modeller prepares a model mad
coloured wax, firm in substance, but capable of be
fashioned by means of small bone or hard-wood tools.
model the workers in metal operate, by casting, or
or hammering, according to the shape of the vessel
duced. The metal employed (at the large establ
Messrs. Elkington, at Birmingham, one of the ch
department) is an alloy of copper, nickel, and
white, and fusible only at a high temperature. If
is to be produced by stamping or by brazing, th
rolled into thin sheets, which are worked up into fo
stamping-press or the hammer. [CHASING OF
P. C. S.] But when the article is to be cast (which
elaborate patterns generally are) the operations are
—From the wax model is made a mould of lead, by
the usual way, and from this mould is produced
molten brass, which is of course an exact copy of
model. This brass cast, called the 'pattern,' is
examined, and worked up by chasing-tools to the pr
ness and delicacy of detail. From this brass patter
a sand mould; and in this sand mould the article it
in the alloy or white metal; so that there are th
alternations in wax, lead, brass, sand, and alloy,
which are in the character of casts, and two i
moulds.

When all the mechanical processes necessary to
facture are finished, whether casting, stamping, or ha
the article is cleaned, ground, and polished, in ever
prepare it for the reception of the silver. It is the
into a vessel containing a chemical solution of phos
a medium for connecting the silver with the alloy
and is from thence transferred to the tank or trough
to the galvanic agency. The tank is a vessel in whic

ctured articles may be placed at once, by suspension ods placed across it. In the tank is a chemical solution r; and the wires of a galvanic battery are so arranged e current, in completing its circuit, must necessarily hrough the solution. The result of this action is, that lution is decomposed, and a fine film of metallic silver es deposited on the surfaces of all the articles suspended tank; the thickness of the deposited layer being deter- conjointly by the duration of the immersion, the th of the solution, and the strength of the current. In gress of the operation the solution becomes exhausted ilver; and, to keep up the supply, plates of pure silver spended in it; the silver dissolves in the liquid as y as the deposition on the articles takes place, atom for

en the manufactured articles are taken out of the they present a remarkably dead appearance; this is ed, first, by friction with 'scratch-brushes' of brass and then by burnishing with hard smooth pieces of stone.

the article—whether a piece of table-plate, a button, or ket—is to be coated with gold instead of silver, a process lly similar to the above is followed; the nature of the in the tank being the chief object of difference. many other metals can be deposited in a similar way; d and silver are the two to which attention is princi- rected.

-*deposit, in electro-plating*. A far more remarkable ent of electro-plating than the above is that in which le substance of the manufactured article is produced sition from the liquid in the tank; an operation con- g perhaps the most striking example of electricity ap- the arts.

ecting this object, the design is first modelled in wax; in lead is taken from the model; a cast in brass is rom the mould; and this cast is worked up by the —just as in the former instance. But instead of making in sand from the pattern, the mould is formed in a composition of glue and treacle, which has, when fficient elasticity to enable the pattern to be removed with facility, however much 'undercut' the device From this elastic mould a cast is taken, in a pecu- ken composition; and this cast, when further prepared, nded in a tank containing a chemical solution of copper. ic agency is then resorted to, to deposit a layer of copper omposing the solution) on the surface of the model, and er is made of such a thickness that when the waxen is melted out from within it, the copper may be able to its shape unsupported. The result of the numerous copy- that the *inside* of the copper shell represents a mould *outside* of the article to be manufactured. The exterior copper is protected by a resisting composition, and it suspended in a tank containing a solution of silver (or s the case may be); the galvanic current causes the tion of the gold or silver on the inside of the copper ; deposition on the outside being prevented by the g composition. When a sufficient thickness of the us metal is thus obtained, the copper mould is exposed action of an acid which gradually eats it away without g the gold or silver beneath. The result is, that after e of the wax model, the lead mould, the brass pattern, ue mould, the composition model, and the copper shell, is produced a vessel or ornamental article of absolutely ilver or gold, presenting the same pattern as the original odel, and derived from the metal which had formed f a chemical solution.

might naturally be supposed that the particles of metal ht together in this singular way from a liquid would be ent in that coherence which is one of the features of etallic state. But such is not the case. The manufac- articles have a sonorous 'ring,' and a power of bearing hing with the hammer, which show that the mutual co- n of the particles is considerable.

lectro-deposit, as a protection or as an ornament. The sition of a thin metallic layer on a body prepared for its ption being thus rendered very practicable, the applications e method—some actually practised and some only sug- d—have become very numerous. It is in most cases as tection, as an ornament, or as a copy or type, that these ications are intended.

s a protection, Mr. Dent has applied electro-gilding to ometer-springs. At the Plymouth meeting of the ish Association (1841) Mr. Dent stated that the common process of 'blueing' the steel balance-springs of chronometers very much affects the elastic force of the spring; and he therefore proposed the employment of electro-gilding instead of blueing, as being an efficient protector from the ill effects of damp and saline atmospheres. Professor Christie at the same time stated that this plan of Mr. Dent's had suggested to him the advantage of protecting magnetic bars and needles by the same means, to prevent the disturbing effect often exerted by the oxidation of the surface of these delicate instruments.

Medallions are sometimes coated with copper as a means of preservation cr of beautifying. The medallion is first coated with black-lead, and then exposed to a solution of copper (in the state of sulphate or some other salt), the metal of which is precipitated on the medallion by a galvanic current. Fruit, small twigs, leaves, seeds, and other vegetable specimens, may be similarly coated with copper; either for ornament or for the purpose of illustrating the size and form of the object. Apples and pears are similarly capable of being coated, by being either brushed over with powdered black lead or steeped in a liquid preparation of phosphorus, and then immersed in the tank. Indeed this method is capable of producing very beautiful results. The writer has seen three sprigs of holly, taken from the same branch, completely coated in the course of a few minutes, the one with copper, the second with silver, and the third with gold, all absolutely pure, and conforming to the most minute and delicate features of the plant. Insects too, such as butterflies, may be thus coated with a metallic film; and it is a striking proof of the equability with which the particles of metal arrange themselves, that the exquisite framework of the insect's wings is exhibited almost as distinctly as in the natural state. Mr. Smee gives similar examples. He says ('Elements of Electro-metallurgy,' p. 222), 'The beauty of electro-coppered leaves, branches, and similar objects is surprising. I have a case of these specimens placed on a black ground, which no one would take to be productions of art. . . . When I state that the numerous hairs covering the leaves of a *melastoma*, and even the delicate hairs of the *salvia*, are all perfectly covered, the botanist must at once admit that these specimens have rather the minuteness of nature than the imperfections of art.'

In the preservation of all such fruits and vegetables, as apples, pears, gourds, grapes, cucumbers, and potatoes, by electro-coppering, a pin is inserted before the immersion, and on this pin being afterwards removed, the hole left by it furnishes an outlet for the sap and moisture from within; and it is found that in many cases the inside dries up completely without deranging the shape of the copper envelope.

Ornamental baskets, whether made of wicker or of wire, are coated in a similar manner. So likewise are lace and other articles made of woven fibres. Indeed, should a taste for productions of this kind spring up, the means are at hand for extending the art almost indefinitely; for by a preliminary steeping in a solution of phosphorus, or some other chemical agent, almost any substance may be brought into a state to receive a deposition of metal in a delicate film; and this film may be of copper, silver, gold, platina, or nickel. Porcelain and earthenware might without much difficulty be brought under similar operations.

Electro-deposit, as a means of Copying. The details given under VOLTAGRAPHY, P. C., belong to the present section of our subject; by a reference to that article it will be seen that the obtaining of an exact copy, type, or counterpart of any device, whether it relate to the fine arts or to the manufacturing arts, is the object in view; and a few other particulars, in addition to those there given, will suffice.

The electro-process has been recommended not only for copying engravings, but for making the copper-plate itself on which an engraving is to be executed. The copper-plates prepared for engravers generally contain a small portion of other metals, which render both the engraving and the etching somewhat uncertain: by the substitution, therefore, of plates produced by electro-deposition, in which the copper is quite uncontaminated with other metals, an advantage is anticipated. To produce these plates, a copper-plate is prepared in the usual way and suspended in a copper solution, by which a film of any desired thickness may be produced; and by a previous adjustment of the plate, the new portion may be separated from the old in the form of a distinct plate, susceptible of after-preparation for the engraver. Or, the copper-plate, instead of being made by deposition upon another plate of the same material, may be produced on a flat surface of wax or plaster properly prepared.

to be black in the impression are left untouched on the —a plan directly the reverse of the former. In order d the artist in producing the required effect, he uses a e paint on a black ground; the metal plate may be kened by hydro-sulphuret of ammonia, or by other agents; a white paint may be formed from a mixture of sulphate ad, white wax, lard, and olive oil. The mode of pen- ng is entirely different from that adopted in the former , and, as would appear, more difficult; for the artist has void with his pencil all the parts which are to form the ace or inked part in the impression. When the plate is shed it is coated with black-lead, and immersed in the hate of copper; whereby a plate is produced fitted for ce-printing.

Minor improvements have been introduced in these curious nches of art; and specimens of pictures produced by these ss have been recently given in the illustrated newspapers. inions may perhaps differ as to the ultimate success of the hod, artistically and commercially; but its ingenuity cer- y claims for it a fair trial.

ECTRO-PLATING AND GILDING. [Electro- llurgy, P. C. S.]

ECTROTINT. [Electro-Metallurgy, P. C. S.]

ECTROTYPE. [Electro-Metallurgy, P. C. S.]

EO'CHARIS, a genus of plants belonging to the na- order Cyperaceæ, and the tribe Scirpeæ. It has fertile s, the lowermost layer with 1 or 2 of the lowest empty; ristles. The nut compressed, crowned with the per- t dilated base of the style. There are three species of enus, known by the name of Spike-Rushes, found in Britain.

palustris has a creeping root, and the stem clothed with ranous obtusely truncate sheaths: it grows in marshy s, forming sometimes a large proportion of the peat found gs. *E. multicaulis* has slightly creeping roots, with the clothed with obliquely truncate rather acute sheaths. *icularis* has a fibrous root, and numerous slender erect , and very small spikes. It is found in damp places beaths.

abington, *Manual.*)

LEPHA'NTOPUS (from ἐλέφας, an elephant, and πούς, t, on account of the shape of its radical leaves), a genus lants belonging to the natural order Compositæ, the sub- Corymbiferæ, the tribe Vernoniaceæ, the subtribe Ver- eæ, and the division Elephantopeæ. It has heads aining 3-4-5 florets, equal flowered, closely collected into luster, surrounded by leaves; the involucre compressed in ws, the leaflets dry, oblong, alternately flat and folded, inner usually 3-nerved; the receptacle naked; the corolla ate, with a 5-cleft limb, which has acuminate segments 1 recess deeper than the others; the filaments smooth, branches of the style half subulate; the achenium rather ressed, many ribbed, oblong, hairy; the pappus in 1 consisting of several straight paleæ, dilated at the base, otherwise very narrow, acuminate, equal, and serrated.

scaber has a hairy dichotomous stem, the radical leaves rous, cuneate, and very much narrowed at the base, those e stem lanceolate. This plant is common in almost all of India, in dry elevated positions. It has a stem a high, with the heads of pale red flowers on long stalks. roots are fibrous. Both the roots and the leaves are ted to have active medical properties. The natives on Malabar coast use a decoction of them in cases of dysuria. re are other species natives of South America and the t Indies.

indley, *Flora Medica*; Loudon, *Encyclopædia of Plants.*)

LIMINATION. This word is from *eliminare*, to drive of doors, and it is used in mathematics to signify the ation of an equation or equations which do not contain a ain quantity, by means of given equations which do con- that quantity. Thus in so simple a case as $x=y, x=z$, means of these two equations we deduce the obvious lt $y=z$, we have eliminated x, or formed a third equation hich x is not found. Elimination is an essential part of many mathematical processes: and in the present article can only attempt to give a few general notions, such as help a student to connect different portions of his alge- cal reading.

f the solution of equations were perfect, so also would elimination. Having 10 independent equations for in- ce, each containing x, y, and z, if we could choose any e, and from these three find x, y, and z, we might substi- these values in the remaining seven equations, and thus form seven equations independent of x, y, and z. The general rule is that from m equations can be formed $m-n$ equations with n quantities eliminated. But not only must the equations be independent of each other, but no two or more must be capable of what we may call simultaneous elimination. Suppose, for instance, x and y never enter into a set of equations except in functions of, say, x^2+y^2. If then we make $x^2+y^2=p$ and substitute, we have a set of equations not containing either x or y, but containing p. If by means of one of these we eliminate p from the rest, the process which does this, applied to the original equations, would allow of our eliminating both x and y by one equation only.

As to equations which are not purely algebraical, or which contain more than powers or roots, or combinations of them, we cannot pretend to say that there is any organized method of elimination existing, except that of solution. For example, we can eliminate x between the equations $x=\log(x+y)$, and $\sin(x+y)=\epsilon^y+x$, because it so happens that we can find y from the first, as in $y=\epsilon^x-x$: and this value of y may be substituted in the second. But if the first equation had been $x+2y=\log(x+y)$, we could not have found either quantity in *finite* terms of the other, from either equation. In such a case, we must have recourse to infinite series: with these instruments, elimination is always theoretically possible. But whether the results produced will be convergent, and otherwise convenient for use, must depend upon the circumstances of each case. When, however, elimination is spoken of, elimination in finite terms is generally understood.

Let us now take simple algebraical equations, and suppose a pair of them, containing x and y, as $xy^2-x^2y-2=0$, $y^2+x^2y-6=0$. Let these be $P=0$, $Q=0$, and proceed as in finding the most complicated common divisor of P and Q. And first, let it appear that there is a common divisor R, and let $P=RA$, $Q=RB$; so that A and B have not any common algebraical divisor. These equations may then be both satisfied by making $R=0$, which being only one equation between x and y, admits of an infinite number of solutions. But they may also be satisfied by $A=0$, $B=0$, the method of treating which falls under the next case.

Secondly, let there be no algebraical common divisor. Then, if we take y as the principal letter, there will at last be a remainder which is a function of x only: let this be X. Now it is easily proved that when P and Q vanish, X must vanish also; that is, no values of y can make both P and Q vanish, except in combination with values of x, which make X vanish. All the required values of x, then, satisfy $X=0$. But is the converse true, and are all the roots of $X=0$ capable of combination with values of y, so as to satisfy both equations? This question will require some consideration.

In the preceding process, when y is made the principal letter, we have generally this alternative, either to introduce fractional functions of x into the result, or else to employ multipliers beforehand to avoid it: these multipliers will be functions of x. Let us allow of fractional functions of x, and suppose the process to be as follows:—

$$\begin{array}{l} P\,)\,Q\,(\,M_1 \\ \qquad N_1\,)\,P\,(\,M_2 \\ \qquad\qquad N_2\,)\,N_1\,(\,M_3 \\ \qquad\qquad\qquad X \end{array}$$

We have then

$$\begin{aligned} Q &= M_1 P + N_1 \\ P &= M_2 N_1 + N_2 \\ N_1 &= M_3 N_2 + X \end{aligned}$$

Take a value of x which makes X vanish, and with this value of x, find a value of y which makes P vanish. We have then $Q=N_1=M_3N_2=-M_3M_2N_1$, or $N_1(1+M_2M_3)=0$. If then $1+M_2M_3$ should not happen to vanish, we must have $N_1=0$, or $Q=0$; that is, a root of $X=0$, combined with a value of y which makes $P=0$, also makes $Q=0$. But if it should happen that $1+M_2M_3=0$ is satisfied by the values of x and y, we have not this assurance that $Q=0$. Again, if M_1, M_2, or M_3, be made infinite by the value of x, the whole process fails. All we can say then is, that though $X=0$ must contain among its roots all the values of x required, it may possibly contain other values.

Next, suppose we introduce a multiplier to avoid fractions. Let it be convenient to begin with QZ and P, instead of Q and P. Then when QZ and P both vanish, X vanishes; but we can now only say that the roots of $X=0$ may, with proper values of y, satisfy one or the other of the systems $Q=0$, $P=0$, or $Z=0$, $P=0$.

We shall take the following example, to show how comparatively complicated the results of a very simple instance may be. Let the equations be

$$P=xy^2-x^2y-2=0,\ Q=y^2+x^3y-6=0$$

Multiply Q by x, to prepare for division without fractions, and divide by P: the remainder is $x^2(x^2+1)\,y-(6x-2)$. Multiply P by $x^4(x^2+1)^2$ for a similar reason, and divide by the remainder. The second remainder, X, is

$$2x^7+6x^6+2x^5+6x^4-36x^2+24x-4$$

One of the roots of this is $x=1$, with which it will be found that $y=2$ satisfies the equations $P=0, Q=0$. And in this instance it does happen that all the seven roots of X are capable, each with its proper values of y, of satisfying the given pair of equations.

If we take the principal letter to be x, the problem of ordinary algebraical elimination is reduced to eliminating x from two such equations as $ax^m+bx^{m-1}\ \dots=0$, and $px_m+qx^{n-1}+\dots=0$, where a, p, &c. are functions of the other letters. The mode which we have always adopted as most convenient in practice is as follows:—Suppose the equations to be

$$ax^3+bx^2+cx+e=0$$
$$px^3+qx^2+rx+s=0$$

Multiply by p and a, and subtract, which gives an equation of the form

$$Ax^2+Bx+C=0$$

Multiply by s and e, subtract, and divide by x, which gives another equation of the form

$$Px^2+Qx+R=0$$

Repeat the same sort of process, making the first terms destroy each other, and then the last; we are thus led to two equations of the first degree, from which x may be at once eliminated. The same method will do when the equations are of different degrees, but in that case it is more convenient to bring down the higher to the lower, first, in the following manner:—Suppose the equations to be $ax^7+bx^6+cx^5+ex^4+\dots=0$, and $px^4+qx^3+\dots=0$. Multiply by p and by ax^3, and subtract, which gives a new equation of the form $Ax^6+Bx^5+\dots=0$. Multiply by p and by Ax^2 (using the lower of the given equations) and subtract; and continue this process until a second equation of the fourth degree is found: after which proceed with the first and last terms as before.

The problem may be reduced to that of elimination between purely linear equations, as follows:—Suppose it required to eliminate x between $ax^2+bx+c=0$, and $px^3+qx^2+rx+s=0$. Multiply both these equations by x, and we have then four equations involving the first four powers of x. Multiply again by x, which gives six equations involving the first five powers of x. Let these five powers be considered as five distinct quantities, x_1, x_2, x_3, &c., and eliminate these five quantities between the six linear equations, which are

$$\begin{array}{ll} ax_2+bx_1+c=0 & px_3+qx_2+rx_1+s=0 \\ ax_3+bx_2+cx_1=0 & px_4+qx_3+rx_2+sx_1=0 \\ ax_4+bx_3+cx_2=0 & px_5+qx_4+rx_3+sx_2=0 \end{array}$$

Since two equations are introduced at each new step and only one new power, there must be a step at which the number of equations becomes equal to the number of powers, after which, at the next step, the number of equations will be in excess by one, which is what is wanted for elimination. It is also worth notice that if we were to stop at the step at which the number of equations is the same as that of powers and find the powers as independent quantities, we might then eliminate between the first and second power, and produce the result in the form $A^2-B=0$.

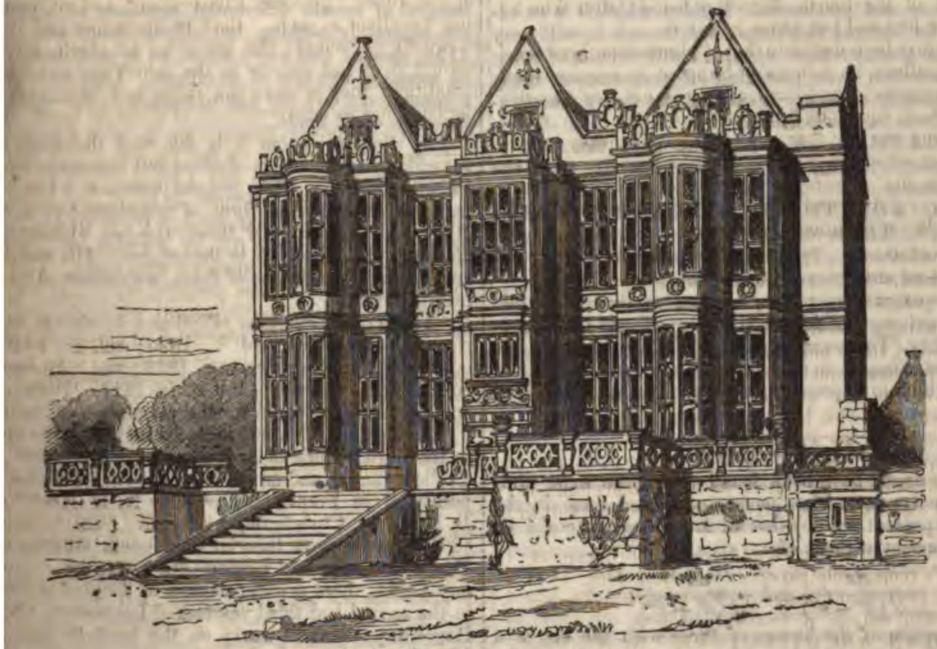
On this subject see Dr. Peacock's *Algebra*, vol. ii. cap. 44; or Mr. Sylvester's remarkable papers, *Phil. Mag.* Dec. 1839, Feb. 1840, June, 1841; also *Cambridge Mathematical Journal*, vol. ii. pp. 232, 276, vol. iii. p. 183, vol. iv. p. 9.

ELIZABETHAN ARCHITECTURE. By this name we distinguish that transition style which prevailed in England from about the middle of the 16th, to the end of the first quarter of the 17th century, and was accordingly in its meridian during the long reign of Elizabeth. If it were worth while to disturb a name already fixed, it might with equal or even greater propriety be termed the *English Renaissance*, it being a style formed out of the continental Renaissance engrafted upon our own Tudor and old English domestic styles; and it was, we may observe, applied exclusively to domestic, or at least secular buildings, in which respect it was very differently circumstanced from the Gothic style, which was
almost as exclusively ecclesiastical in character and
The age of Elizabethan architecture was that of palace
not church-building; and a style developed itself
eminently palatial in many of its qualities—certainly
cient in stateliness—one very important ingredient,
deficient in picturesqueness. By no means do we
assert that statelinessand picturesqueness invariably
productions in that style, because many of them poss
the one quality nor the other; yet such is the cas
gard to all styles; a style being only a particular
architecture, and the merely making use of it does
the power of employing it with mastery or even with
otherwise we should not have so much flat and vulgar
tural prose under the name of the Classical, Italian,
styles. Very few architectural writers however
mitted the claims of Elizabethan to be considered
those who have spoken of it as requiring some histor
tion, have done little more than enumerate some ex
it, while others have condemned it in the most
manner. If the censurers of Elizabethan had taken
they might perhaps have made out a tolerably fair ca
the style—at least what would have looked so,
reality founded upon one-sided argument; wherea
not even make any show of criticism at all. To
Elizabethan is neither Gothic nor Italian is childish
was, it would not constitute a style by itself; to
disdainfully as an impure style is not much wiser,
transition styles are of necessity more or less impu
ing as they do of elements that have not yet be
into consistency; to denounce it as illegitimate, w
convincing us that it is worthless, is sheer extrava
art the successful is always the legitimate. A sty
be judged by unworthy specimens or commonpla
tions in it, but according to what it is when tr
taste, and according to the scope it holds out to tho
capable of so treating it. There certainly is a gr
mere dross in Elizabethan buildings; and it is
while on the one hand it has caused it to be con
essentially corrupt, has on the other obtained for it
of those who fancy that its seeming waywardness
rejection of all positive rules render it particular
imitation, and that its merest conceits put togethe
will constitute 'genuine Elizabethan,' and of co
thing excellent as such. Both its detractors and
are equally one-sided: the latter are as obstinatel
its worst vices and defects as the others are to its
capabilities; they mistake the faults and blemishe
cular buildings for characteristics of the style itself.
interest it certainly possesses, nor is it deficient
merit: accordingly it has of late years engaged th
of architectural draftsmen and designers, and has
the subject of several graphic publications (such
admirable 'Old English Mansions,' C. J. Richard
chitectural Remains of the Reigns of Elizabeth and
Hall's 'Baronial Halls,' Shaw's 'Elizabethan Ar
&c.); and it has also been occasionally adopted
with more or less success, especially for internal
with which, however, the affectation of antiquarian
one hand, and of mere fashion on the other, have
much to do as true taste. The style itself, indee
means one for either indiscriminate or servile c
even the very best examples present something exc
and what, though we tolerate it in them becaus
genuine and authenticated records of the style, becom
able at second-hand in what we know to be of moder
tion. In the hands of an artist capable of treating it
freedom and feeling—of seizing upon and bringing
better qualities, and not afraid of discarding or
its baser ones, very much may yet be made of El
and there surely need be no scrupulousness
pering with a style which is in a manner outlaw
majority of architectural teachers. In one respect
bear any great liberty to be taken with it, since
admit of being simplified—that is, not by the usual
paring down—of omitting embellishment, and
such members as are retained. Deprived of vigou
ness, many of the forms become not only spiritle
couth; and on the other hand, embellishment, with
to other essential characteristics, may be made to
tawdry ornament. Strange as it may sound to
great difficulty attending this style arises from t
nothing like a system of rules for it—no standard
for many of the very best examples differ so very

er, that they are rather apt to bewilder by the ey afford. Hence merely to say that a building—cially a modern one—is in the Elizabethan style, is hing—is rather telling us what it is not than what s. We have things of the most opposite character passing under that name; there are, for instance, fronts in the metropolis, one at the corner of the in Regent-street, the other at that of Berners-street d-street, which seem to have been expressly intended ith how much good and with how much bad taste h Renaissance may be applied; for while the former ell-composed and elegant design, the other is an d incoherent jumble of tawdry fragments, without combination.

standing the attention directed of late towards the n style, there is yet no work which gives anything a satisfactory history, or synopsis, or analysis he publications before mentioned, and similar ones, st only of pictorial views, without any letterpress, e which are more professedly architectural are only us collections of studies from particular buildings buildings and their decorations, without arrange- y kind,—valuable as materials, but too fragmentary y clear and comprehensive insight into the style with its numerous and complex modifications. It expected that, within our limits, we should attempt such a systematic scheme as we conceive to be a n; still we may do something to open the way for ing them to expand our hints into a connected and ed treatise.

ally unjust and indiscreet to speak of Elizabethan e, as is usually done, as being marked by the introthe Grecian orders, those employed in it having atever in common with the orders of antiquity but resemblance which renders us all the more sen- prodigious difference between the respective styles. as classical or antique, they can be regarded only e parodies, since the application of them in all the the Renaissance style is as contrary to the prac- antients as their character is dissimilar. The employed merely as decoration, and then only for stories of an edifice, or for distinct compartments Hence they are invariably microstyle, and are still further reduced in height by being placed on tall pedestals, and look all the smaller owing to the spacious proportions of the windows between them. In fact they are to be regarded only as accessories and decorative filling-up; for they have scarcely aught of even the apparent character of columniation. In point of design too they retain little of the orders after which they are named: with the exception of one or two distinctive marks, such as the Doric triglyphs, and the forms of the respective capitals, they are all assimilated in character, the Doric being frequently quite as slender and as much embellished or more so than the Corinthian. Pedestals are mostly panneled and filled in with ornament, the pannels themselves being multiplied in a variety of patterns. The shafts of columns are frequently enriched with one or more bands (either sculptured or plain), and the lower part of the shafts is often covered with arabesque carving. Pilasters are similarly treated—sometimes banded, sometimes panneled, and frequently filled in with arabesques or other ornaments, among which raised facetted blocks are very common ones. Entablatures are almost invariably made to break over columns; and are so crowded with mouldings and other carvings, as to have the look of being all cornice. Orders are usually applied only to parts of a front; for instance, the centre, which is marked out as a lofty frontispiece or portal ornamented with several tiers of columns, and thus not only distinguished from the rest, but in many instances rendered quite distinct from it, all besides being comparatively genuine Tudor, without any intermixture of foreign elements. Even where such is not the case, the Tudor physiognomy manifests itself in windows and bays, which last are almost as peculiar to our English architecture of the period as small circular towers and turrets with conical or spire-like roofs are to that of Flanders and France. Although square-headed, and without tracery of any kind, the windows retain a good deal of the latest Gothic or perpendicular character, being divided by mullions and transoms into numerous compartments after the manner of panneling, a mode that freely admits of a window being made of any extent; and not only are single windows sometimes exceedingly spacious, but are put so closely together as to render the whole of a front nearly all window. This fashion, which however is only an occasional variety of the style, may be exemplified by what is called 'the Duke's House,' at Bradford, Wilts, the front of which is made up



[The Duke's House, Bradford, Wiltshire.]

windows and bays, in a manner that would be too , were not the plan-line broken by semicircular being thrown out, as smaller bays, from the larger s the design acquires a pleasing playfulness of it is besides not only marked by perfect regularity ion, but also by a certain compactness, the windows the appearance of being intended for separate ueezed together for want of more space. The pon the bays, consisting of fanciful open-work, enhance the general richness of effect, and both they and the parapetted terrace serve to indicate what are pleasing peculiarities in the style. But the building here given by way of specimen affords no example of the characteristic Elizabethan gable, a feature so singularly diversified, that to exhibit only the leading varieties of it would require a series of cuts, beginning with the simplest and proceeding to the most complex forms. In the absence of such illustrations, we can only say that almost every imaginable combination of curves, both concave and convex, with straight lines and angles, are to be met with in gables. Differently shaped gables often occur in the same building, and produce very great effect of outline, which is further increased by embellished parapets, with balls and other ornaments upon them, by small domes on turrets, and by chimney-shafts, all which, mingled together in glorious confusion, often give an air of picturesque magnificence to what are otherwise rather plain and homely structures, and impart animation to what would else be lumpish masses. In like manner porches and balustraded terraces often give character to the lower part of a building, while the upper may be comparatively flat and uninteresting. The style is excellently well adapted for brick and stone, such contrast of colour seeming natural to it, and serving to bring out the several parts more distinctly. We hardly need observe that the brick ought invariably to be red, and of superior quality and execution; for white or yellow bricks are so far from producing a similar effect, that they have both an insipid and mean appearance, the building seeming at a distance to be of stone, and when approached discovered to be of an inferior material. The brickwork itself is often variegated by the intermixture of darker bricks so disposed as to form a regular pattern on the walls, generally consisting of intersecting diagonal lines. There are also many instances of brick alone being employed, the ornamental members being formed of moulded bricks, and though the effect is comparatively sombre, it is by no means unpleasing.

To the internal characteristics of the Elizabethan style belong spacious bay-windows; long and ample galleries [GALLERY, P. C. S.], but generally of low proportions; massive and elaborately sculptured chimney-pieces [CHIMNEY-PIECE, P. C. S.]; screens of similar character, either with open arches or doors; wainscoted and panneled walls; ceilings highly enriched, and sometimes arched, and entirely covered with scroll-work foliage; and wide staircases with richly carved balustrades. [STAIRCASE, P. C.] The prevailing character is that of heaviness and stateliness; on which account it is ill-suited for literal imitation at the present day, especially for houses upon a moderate scale, or for small rooms. In external architecture many of the defects of detail are merged in the picturesque impressiveness of the whole; but a similar degree of capriciousness and heaviness brought near to the eye within a room, is apt to strike chiefly as too rudely grotesque and ponderous. Besides which it is an expensive style for internal finishings; for though it will very well bear to be greatly refined upon, it hardly admits of being simplified, decoration even partaking of gorgeousness being almost indispensably necessary to conceal the native uncouthness of both forms and proportions.

ELLIPSOLITHES. Mr. Sowerby gave this title to some (compressed?) forms of fossil Cephalopoda, from the mountain limestone.

ELLIPTIC FUNCTIONS, or ELLIPTIC TRANSCENDANTS. This is no subject for a Cyclopædia, except in a very limited sense. We can only undertake here to describe the general character of the subject.

If we had passed direct from algebra to the differential calculus, without any consideration of logarithmic or trigonometrical quantity [TRANSCENDENTAL, P. C.], we should have found ourselves stopped in the integral calculus by want of language in which to express the integral of such a function as

$$\frac{dx}{\sqrt{(a+bx+cx^2)}}.$$

It would no doubt have been found (since the same difficulty has been conquered in a more complicated form in the subject of the present article) that all such integrals could be expressed by means of those of

$$\frac{dx}{\sqrt{(a^2-x^2)}} \text{ and } \frac{dx}{\sqrt{(a^2+x^2)}};$$

and the connection of the former of these with the arc of a circle, and of the latter with logarithms, the properties of the functions called sines and cosines, tables of their values, with a complete system of trigonometrical formulæ, would speedily have followed. From this mode of arriving at a new set of transcendentals we are saved by having the science of trigonometry already prepared on a geometrical basis, in connection with the properties of the circle. But we have no such preparation founded on the ellipse, a curve which is an extension of the circle. Nor is there any connection between the arc of an ellipse and the eccentric anomaly, the angle which is the *extended* representative of the angle at the centre in the circle, except by means of a definite integral. In fact,
semi-axis major, e the eccentricity, ϕ the eccen
and s the arc, we have

$$s = a\int\sqrt{(1-e^2\cos^2\phi)}\,.\,d\phi.$$

The integral calculus is, as yet at least, the onl
which the arc of an ellipse can be approached:
a large class of integrals, closely related to, an
among them, the expression for the arc of an
received the name of elliptic functions.

By an elliptic function is meant any integral of

$$\int\frac{P\,dx}{\sqrt{(a+\beta x+\gamma x^2+\delta x^3+\epsilon x^4)}},$$

in which P is a rational function of x. This c
to depend for its determination upon the form

$$\int\frac{Q\,d\phi}{\sqrt{(1-e^2\sin^2\phi)}},$$

in which Q is a rational function of $\sin^2\phi$, and e
unity. This again can be shown to depend upon

$$\int\frac{A+B\sin^2\phi}{1+n\sin^2\phi}\,.\,\frac{d\phi}{\sqrt{(1-e^2\sin^2\phi},}$$

which in every case depends upon one or more
following forms:—

$$\int\frac{d\phi}{\sqrt{(1-e^2\sin^2\phi},}\qquad \int\sqrt{(1-e^2\sin^2\phi)}$$

$$\int\frac{1}{1+n\sin^2\phi}\,.\,\frac{d\phi}{\sqrt{(1-e^2\sin^2\phi)}}$$

which are called functions of the first, secon
species. Every elliptic function represents the
algebraical curve.

The earliest researches into the integrals co
the arcs of an ellipse or hyperbola are those o
in his treatise on Fluxions, and of D'Alembert,
lin Memoirs for 1746. Fagnani, in 1750, show
arcs of an ellipse might be assigned in an infinit
ways, which should have for their difference an a
pression. Euler, in 1761, showed how to assign
integral of certain differential equations of whic
are separately nothing but elliptic functions.
1755, showed that every arc of an hyperbola ca
by means of two arcs of an ellipse. Lagrange,
a general method for approximating to the valu
functions of all kinds.

But those to whom it is due that the theor
functions has become a distinct and important b
integral calculus, with general formulæ which
make it an extended form of trigonometry, a
Abel, and Jacobi. Of these, the first [LEGEN
almost devoted his life to the subject. His vari
and his latest extensions of them, are contained i
lowing works.

'Traité des Fonctions elliptiques et des Int
riennes,' 4to., Paris, vol. i., 1825; vol. ii., 18
containing three supplements, 1828; and 'Exer
cul Intégral,' 3 vols. 4to., Paris, 1811. Both
contain extensive tables for the calculation of the

The memoirs of Abel, the substance of some
in the third volume of Legendre, were originally
Crelle's journal, and are now collected in his works
published in French, 'Œuvres de N. H. Abel,'
B. Holmboe, Christiania, 2 vols. 4to., 1839. Ja
'Fundamenta nova theoriæ functionum elliptic
D. C. G. I. Jacobi,' Regiomonti, 1829, 4to. A
tary works, there is some account of Legendre's
in the second and third volumes of Leybourn's '
Repository:' several works on the integral calc
Mr. Hymers in particular, contain the first elem
is a work on the subject expressly by M. Verh
in Belgium; and there is an article on elliptic
definite integrals in the 'Encyclopædia Metropol

ELLIPTIC POLARIZATION, in the undul
is the name given to a supposed rotation of the
ether in the peripheries of ellipses when a pe
polarized light is made to suffer reflexions in th
glass, or at the surfaces of polished metals.

Let, for example, a pencil of light be polari
plane by reflexion from the surface of glass at th

ng angle; and let it be made to enter an oblique paral- iped or rhomboid of glass perpendicularly to one of its , the inclinations of two opposite sides of the rhomboid e ends being equal to the polarizing angle: the pencil of will then suffer two reflexions, one from each of two ite sides of the glass, and it will emerge perpendicularly opposite end. Now, if the sides of the rhomboid are osed that the plane in which the two reflexions take n it are coincident with, or at right angles to the plane h the pencil of light is polarized, no effect is produced pencil; but if the parallelopiped be turned on an axis dicular to its two ends till the plane in which the two ns take place is inclined to the plane of the original ation in an angle equal to 45°, 135°, 225°, or 315°, the nt pencil will be found to be circularly polarized. LAR POLARIZATION, P. C. S.] If the inclination of anes be any other angle than one of these, excluding e angles 0°, 90°, 180°, 270°, the pencil will be ellipti- olarized.

s, if y and z be rectangular co-ordinates of a particle of the former in the plane of the two reflexions and the perpendicular to it; and if the plane of the reflexions lined at an angle represented by α to the plane of po- on; then the general equation for a vibration (supposed place in a plane perpendicular to the plane of polariza- being $a \sin.\, p\,(vt-x)$, the resolved vibrations perpen- and parallel to the plane of reflexion would be, tively,

$$\begin{aligned} & z=a\cos.\,\alpha\,\sin.\,p\,(vt-x) \\ \text{and}\quad & y=a\sin.\,\alpha\,\sin.\,p\,(vt-x). \end{aligned}$$

e phase in the latter being conceived to be accelerated uarter of a vibration, or 90°, when compared with the (*Airy's Tracts, Und. Theo.* art. 135), the last equation es

in. $\alpha\sin.\,\{p\,(vt-x)+90°\}$ or $y=a\sin.\,\alpha\cos.\,p\,(vt-x)$:

is obtained

$$y^2 a^2 \cos.^2\alpha + z^2 a^2 \sin.^2\alpha = a^4 \sin.^2\alpha \cos.^2\alpha,$$

is the equation to an ellipse, and proves that the par- of ether are in the peripheries of ellipses. When , 135°, &c. we have

$$y^2+z^2=\tfrac{1}{2}a^2,$$

is the equation to a circle.

polarized light, after having suffered two reflexions in parallelopiped, be made to suffer two additional ons in a similar parallelopiped, similarly situated, the nt pencil will be restored to a state of plane polariza- but the new plane of polarization will be perpendicular former when the inclination of that former plane to lane of reflexion is 45°, 135°, &c. This is explained 's *Tracts*, art. 142), by assuming that the vibrations in ane of the reflected rays are accelerated 90° by the first elopiped, and another 90° by the second, while no ac- tion takes place perpendicularly to that plane. If the ation be any angle between those, and be represented the like restoration takes place, and the two planes of zation will be inclined to one another in an angle equal

David Brewster discovered that, when a pencil of plane zed light is reflected once from the surface of polished , it acquires properties similar to those which arise from flexions of the light within glass. First, only a partial zation takes place in it when the metal is so disposed he plane of the incident and reflected pencil is coin- with, or perpendicular to the plane in which the pencil iginally polarized. Again, let a pencil of light polar- n any plane be reflected from a plate of polished steel so ed that the plane of the incident and reflected pencils e inclined 45°, 135°, 225°, or 315° to the plane of ori- polarization, the angles of incidence and reflexion from el being 75°; then that which is called an elliptic po- ion takes place: if a second plate of steel be disposed to reflect the pencil a second time at an angle of inci- equal to 75°, and the plane in which the two reflexions ace be coincident with, or perpendicular to one another, encil so reflected will be restored to a state of plane ation as when it suffered four reflexions in passing h two parallelopipeds of glass.

, if the second plate be disposed so that the plane in the two reflexions take place may make any other than those above mentioned with the original plane of ation, the angles of incidence and reflexion at which the plane polarization is restored, instead of being 75°, will differ with the different angles of inclination. Now, in circularly polarized light, the angles of incidence and reflexion at which the pencil is restored to plane polarized light being constantly the same, they may be compared to the constant radius of a circle; and the varying angles of restoration just mentioned being found to correspond nearly to the varying semidiameters of an ellipse, Sir David Brewster proposed (*Phil. Trans.*, 1830, p. 287), without regard to the theoretical existence of elliptical vibrations produced by the combinations of two rectilineal vibrations of unequal amplitudes, to give the name of elliptic polarization to the phenomena presented by light reflected, in the manner above indicated, from metals.

In circular polarization, if the original plane of polarization make an angle represented by + 45° with the plane of the reflexions, the inclination of the plane of restored polarization always makes an angle represented by — 45° with the same plane of reflexion; but this does not hold good in the elliptic polarization: the angle between the original planes of polarization and reflexion being + 45°, the angles between the same plane of reflexion and that of restored polarization will be as follow:—for silver, — 39° 48′; for gold, — 35°; for brass, — 32°; for copper, — 29°; for mercury, — 26°; for platinum, — 22°; and for steel, — 17°. Representing any given angle between the original planes of polarization and reflexion by ω, and the angle of restoration for any one of the metals when, as above, $\omega = +45°$, by θ; then, if the angle of restoration corresponding to a given value of ω be represented by α, Sir David Brewster found from experiment that

$$\tan.\,\alpha = \tan.\,\theta\,\tan.\,\omega.$$

It has been stated that light plane polarized at an angle equal to + 45° with the plane of reflexion is elliptically polarized by one reflexion from steel at 75°, and is restored to plane polarized light in a plane making an angle — 17° with the plane of reflexion: now it is evident that a third reflexion at 75° will again polarize the light elliptically, and that a fourth reflexion will again restore the pencil to a state of plane polarization; and so on, all the reflexions being in one plane. Therefore, substituting — 17°, for ω in the above formula, θ remaining equal to —17°, the value of α becomes + 5° 20′; again, substituting + 5° 20′ for ω, the value of α is — 1° 40′; and, after two more reflexions, the value of α nearly vanishes; that is, after eight reflexions in one plane from steel, the elliptic polarization ceases and the pencil of light is plane polarized in the plane of reflexion. A greater number of reflexions are however necessary when the other metals are used.

In what has been said the several consecutive reflexions are supposed to have been in one plane; but if the metal plate from which the second reflexion is produced be turned round on the first reflected pencil so as to change the plane of reflexion, the original angle of incidence from steel being 75° as before; the angle of reflexion at which the elliptically polarized pencil is restored changes also: when the two planes of reflexion are coincident, or at right angles to one another, the angle of reflexion for the restored pencil is 75° as above; but, if the inclination of the planes is 45° or 225°, the angle of reflexion becomes 78°: if the inclination is 135° or 315°, the angle of reflexion is 68°.

By taking the complements of the angles of reflexion for different angles of inclination, and considering them as radii, Sir D. Brewster has found that they appertain to a curve which is nearly an ellipse whose major and minor axes are situated, one at 45° on the right, and the other at 45° on the left of the plane of the first reflexion. He finds also that, with steel, the major axis is to the minor axis as 22 to 12.

It has been proved that, in particular states of the incident pencil, elliptic polarization may take place in an ether whose particles are symmetrically disposed; and that, in an ether whose particles are unsymmetrically distributed, elliptic polarization is a necessary result. See *General View of the Undulatory Theory*, by Professor Powell, 1841.

ELLISTON, ROBERT WILLIAM, was born in Bloomsbury, London, on the 7th of April, 1774. His father was a watchmaker, one of whose brothers was Master of Sidney Sussex College, Cambridge. Young Elliston was placed at St. Paul's school, where he distinguished himself by recitations: but, when he was the fourth boy, he ran away from school, became for a few weeks a lottery-clerk at Bath, and in that town, in April, 1791, appeared on the stage for the first time, personating a very humble character in Richard the

Third. He then obtained an engagement in the company of Tate Wilkinson, at York; but, soon becoming tired of playing petty parts, he obtained through his uncle a reconciliation with his family, and returned home. But the truant disposition was invincible. In the season of 1793 he played regularly at Bath, undertaking characters of all sorts: and in 1796 he married Miss Rundall, a teacher of dancing there. In June of that year he made his first appearance on a London stage, playing at the Haymarket, in the same evening, the part of Octavian, and that of Vapour in the farce of 'My Grandmother.' After occasional appearances in that theatre, and a temporary engagement at Covent-Garden, he became in 1803, under Mr. Colman, principal actor and acting manager of the Haymarket. Next year he succeeded John Kemble at Drury Lane; but, after the burning of the theatre, he quarrelled with Thomas Sheridan and left the company. He now took on his own account the small house then occupied as the Circus, to which he gave the name of the Surrey Theatre. There he and his company performed some of Shakspeare's plays and several operas, altering them so as to evade the licence of the patent theatres; and in 1805 he published his only literary effort, 'The Venetian Outlaw,' a drama in three acts, adapted from the French.

On the re-opening of Drury Lane theatre, Elliston, again a leading actor in its company, delivered Byron's address and performed Hamlet. In 1819 he became the lessee of that theatre, at a rent of 10,200*l.*: and he held this lease till his bankruptcy in 1826. From the date of that event he sunk into a subordinate position. After speculating in the Olympic theatre, he became again manager of the Surrey; and there, till near the close of his life, he continued occasionally to perform. He died of apoplexy on the 7th of July, 1831.

Elliston has been asserted, not without some show of reason, to have been the very best comedian of our time. Others surpassed him in particular excellences: but none united so many of the merits essential to eminent success in the highest walk of comic acting. So, likewise, he rose higher perhaps in tragedy than any other actor who was distinguished for excellence in comedy: he was admirable in those tragic parts which do not pass altogether out of the sphere of ordinary life. The weaknesses and eccentricities of his own character have furnished to Charles Lamb and others the themes for an infinite fund of good-humoured raillery. His predominant failing was inordinate self-esteem. He was vain of himself as an actor, vainer of himself as a manager: and in both phases his vanity was continually breaking out in incidents which, while they were irresistibly diverting, exhibited a humorous whimsicality, and a fervid sincerity of self-deceiving imagination, making him one of the most curious objects upon which a kindly observer of human oddities could exercise his scrutiny.

E'LYMUS, a genus of grasses belonging to the tribe Hordeineæ. It has 2 glumes, both on the same side of the spikelet, without awns or setæ, with 2 or more perfect flowers, and the spikelets 2 or 3 together. Several species of this genus have been described. Two only are natives of Great Britain.

E. arenarius, upright Lyme grass, has an upright close spike; the rachis flat, not winged; the glumes lanceolate, downy, not longer than the spikelets. It is a coarse grass, common on sandy sea-shores; and, with other grasses, it sends down long fibrous roots amongst the sand in such a way as to prevent its moving about with the winds. On some parts of the coast immense sandbanks are formed by this grass and others, binding down the sands which are thrown up by occasional and successive high tides. Although this grass, according to Sir H. Davy, yields a large quantity of sugar, it is not eaten by any of our domestic animals.

E. geniculatus, pendulous Lyme grass, has a lax spike bent downwards; the rachis winged; the glumes awl-shaped, glabrous, longer than the spikelets. The stem is 3 or 4 feet high, and the spike 1 or 2 feet long, bent down in a remarkable manner at the second or third spikelet. It has been found near Gravesend. Most of the remaining species are natives of America, both North and South.

(Babington, *Manual of British Botany*: Loudon, *Encyclopædia of Plants*.)

EMBLEMENTS. The executors of a tenant in fee or in tail are also entitled to the emblements as against the heir or heir in tail, but not as against a doweress or a devisee of tenant or fee, for the devise of the land carries with it the crops. [Emblements, P. C.]

E'MBLICA, a genus of plants belonging to the natural order Euphorbiaceæ. It has monœcious flowers; the calyx
6-parted; 3 stamens combined; 3 styles dichot
fruit fleshy, tricoccous, 6-seeded.

E. officinalis is a native of most parts of Ind
tree having a crooked trunk, with branches thi
in every direction; the male branches spreading
ing. The leaves are alternate, spreading, 1 or
and about 1½ or 2 inches broad: the stipules small
the flowers minute, of a greenish colour; the fr
fleshy, globular, smooth, 6-striated: the nut obov
triangular, 3-celled; the seeds 2 in each cell.
this tree is astringent, and is used in India as a
diarrhœa. The fruit is acid, and tastes astringent
eaten acts as a mild purgative. This plant is the
Emblica of Linnæus; and *Myrobalanus Emblica*

(Lindley, *Flora Medica*.)

EMBOSSING is the art of producing raised
patterns upon wood, metal, paper, cloth, or othe
by means of pressure, either applied as a sudden
a stamping-press, or in a more gradual mann
ordinary screw or hydraulic press, or by revolvi
The pattern is usually produced by forcing th
material to be embossed against an engraved di
design is cut or otherwise formed in intaglio;
when the article to be embossed is in the form of
a counterpart to the die, often made of lead or
metal stamped by the die itself, is applied at the
the process. In many cases heat is employed
operation with great effect.

The embossing of cloth for book-covers—an
branch of this art—and the process of stamping
themselves, are noticed under Book-Binding,
p. 221; and in Dr. Ure's 'Dictionary of Arts'
title 'Embossing of Cloth,' is a full description,
with engravings, of a machine for both embossing
silk, cotton, or woollen cloth, paper, or other fab
or more colours by one operation, by means of th
metal cylinders or rollers, either of which may b
for embossing or printing, or for performing both
simultaneously. These cylinders are arranged
pressed with adequate force against, a central or
of paper [Calendering, P. C. S. p. 268] round
fabric to be embossed is caused to pass. A so
felt, is applied round the surface of the paper
answer the purpose of what a printer techn
blanketing, and a smooth iron roller is provided
contact with the paper cylinder, so as to remove
sion which it may receive, through the fabric op
and the blanketing, from the embossing roller.
paper, however, this impression upon the bed-ro
of advantage, as a counterpart to the embossing
in such cases, where it will not produce inconveni
other operation of the machine, it may be allowe
Whenever this is done, the relative diameters
roller and the embossing roller must be exactly
to each other, in order to ensure perfect registe
dence between the sunk pattern on the small met
the raised pattern on the larger bed-roller, durin
of their cycle of revolutions. The embossing
rollers are made hollow for the admission of stea
iron heaters, and they are furnished with appara
plying colour to their engraved surfaces in the s
as the cylinders of an ordinary calico-printing ma
Ure remarks, that for embossing velvets, plain
papers, the surface of the embossing roller must
to leave the pattern or device elevated: such pa
consequently, impressed into, not raised upon, th
the fabric, while for woollens the device must be
or executed in recess or intaglio. The patterns
the former kind of roller, though commonly called
do not strictly accord with the definition above g
conveys what appears to be considered the strict
word.

A very curious process of embossing wood, co
by Mr. Straker to the Society of Arts in 1824, an
in the forty-second volume of their 'Transactio
claims special notice for its ingenuity. Mr. Strak
that raised figures on wood, such as are employe
frames and other articles of ornamental work,
produced either by means of carving, which is a
operation, or by applying to the plain surface o
ornaments cast or moulded in plaster of Paris or
composition, a plan which is not always availabl
vention, which he proposes to employ either alon

with ordinary carving, depends upon the fact, that if ion be made upon the surface of wood by a blunt in- which will compress its substance without actually ay any portion of it, such depressed part will again original level if the wood be subsequently immersed He therefore proposes to draw the required pat- the surface of a piece of wood previously cut to the shape, and then to apply a blunt steel tool, bur- die to all those parts of the pattern which are in- be in relief, so as to form depressions in the surface equal to their required prominence. In doing this, be taken, by the very cautious driving of the instru- avoid breaking the grain of the wood. The whole be planed or filed down to a uniform surface, after wood is steeped in hot or cold water, by the action the parts previously depressed will rise to their eight, and consequently form an embossed pattern ay be finished by the ordinary operations of the CARVING, P. C. p. 331.]

autiful ornaments of embossed leather, available in rving for architectural decorations, medallions, pic- es, cabinet-work, and similar purposes, have been roduced by a process patented in 1839 by M. arath, and thus noticed by Dr. Ure in the 'Supple- his 'Dictionary of Arts,' with a reference to the cond volume of 'Newton's Journal' for a full detail ocess. 'The dies,' he states, 'are made of type- of the fusible alloy with bismuth, called D'Arcet's. ser is beaten soft in water, then wrung, pressed, d fulled as it were, by working it with the hands comes thicker and quite supple. In this state it is e mould, and forced into all its cavities by means of , bone, or copper tool. In other cases the emboss- rformed by the force of a press. The leather, when come dry, is easily taken off the mould, however may be inserted into its crevices, by virtue of its .' The elasticity which thus enables the leather to ed from a mould which is undercut is also important s of preserving the ornaments from injury by frac- he most exquisite delicacy and sharpness characterize ents thus formed, which may be made, at moderate to rival the most delicate carvings of Grinling in beauty, while, from the nature of the material, far less liable to injury.

BROIDERY. This term, according to Miss Lam- Handbook of Needlework,' a volume which, in addi- its practical information, contains much curious and rested historical matter, 'as employed in the writings ntient historians, has reference to all kinds of orna- work done with the needle, thus comprehending s meaning every description of decorative needlework, tapestry, and some descriptions of weaving.' 'At at day,' our authoress adds, 'the term is much more relating to one kind of needlework only, which how- races an almost innumerable variety, both as to the employed and the mode of using them.' The word, ryes, appears to be derived from the French *broderie*, me deduce by transposition from *bordure*, supposing f the term to arise from the circumstance that em- was formerly applied only or chiefly to the borders ; and, according to its present acceptation, it is 'the lling to the surface of woven textures a representa- ny object we wish to depict, through the medium of le, threaded with the material in which the work is ecuted.'

e article TAPESTRY, P. C., p. 42, some remarks will illustrative of the early history of embroidery; but ubject and on the peculiar characteristics of the em- of various nations, much fuller information is con- the work above referred to (pp. 156-190), and in me entitled 'The Art of Needlework,' edited by the s of Wilton (pp. 342-354). In the former work also a description of the mode of executing various embroidery, in some of which a very rich effect is d by inserting pieces of cotton wool, or slips of parch- to suit the devices, between the fabric upon which roidery is executed and the threads of silk or other of which the pattern is formed, so that the embroi- y be raised considerably above the surface. Gold and read are often used in embroidery with good effect, gles or tinsel are occasionally mixed with the needle- The fabric to be embroidered is usually stretched in a frame or loom, and the pattern is drawn either upon its surface, or, if it be very transparent, upon a piece of paper applied underneath it.

Although embroidery has, until within a few years, been a purely handicraft employment, chiefly cultivated by females as a tasteful and elegant occupation or amusement, it has latterly assumed the character of a manufacture, a most ingenious machine for executing it having been invented by M. Heilmann of Mühlhausen. Of this admirable contrivance, which is said to enable a female to embroider any design with 80 or 140 needles as accurately and expeditiously as she formerly could do with one, a minute description, illustrated by an engraving, is given in Dr. Ure's 'Dictionary of Arts,' article 'Embroidering Machine,' from which it appears that the machine was exhibited in Paris at the national exposition of products of industry in 1834, where it excited much attention, and that within a very few years it had been brought into use in France, Germany, Switzerland, and Manchester. Complicated as it necessarily is, the price of a machine for working 130 needles was estimated at not more than 5000 francs, or 200*l*., and such a machine is capable of performing daily the work of fifteen expert embroiderers employed at the ordinary frame. It requires the labour of one grown person to superintend the work, and of two children to change the needles when their threads are used, and to watch continually for any irregularities of action which may need attention.

Referring to the above work for the details of the mechanism by which the several movements are accomplished, we may briefly explain the principle on which it acts. The needles, which are pointed at both ends, and have their eyes in the middle, so that they need not be turned round between each time of passing through the web, are passed backwards and forwards by the action of small pincers, of which there are two pair to each needle, one on each side of the web, each pair being alternately employed in pushing and pulling the needle through the web. As soon as the needles have passed completely through in either direction, a kind of carriage or framing, which carries the series of pincers by which they have been drawn through, begins to move along a railway so as to draw the needles to the full length of their threads, after which the carriage returns to its original position, and its pincers put the needles again through the web, to be received on the opposite side by the other set of pincers, which then retire with them in like manner. So far as the action of this part of the machine can affect the matter, the needles would continually pass through the same holes in the web; but to enable them to pass through it at different points in succession, according to the pattern required, the web itself, which is placed vertically in a frame furnished with rollers on which it can be wrapped as on the roller of a loom, is caused to assume a different position between each passage of the needles. This is done by connecting the frame with a kind of pantograph, the point or tracer of which can be moved at pleasure over every portion of a drawing or pattern, which represents, on a greatly enlarged scale, the flower or device to be embroidered. The operator brings the point of the pantograph successively to every point of the pattern device at which it is desired to plant a stitch, and by this means so moves the web-frame that the corresponding point of every flower, or place where a flower is to be worked, upon it, is brought opposite to the point of one of the needles. The mechanism by which the pincers are worked is then brought into action by means of handles and pedals, by which every needle of the series is put through the web, and drawn until its thread is brought home, after which the needles return to their original position, while by the working of the pantograph another point, or rather series of points, of the web is brought opposite to them ready for the return stitch. By such means every needle of the series produces a distinct and separate copy, on a small scale, of the pattern, the arrangement of the stitches being precisely according to the movements of the pantograph.

E'MBRYON (ἔμβρυον, properly the young of an animal while still in the mother). In Botany the Embryon is that part of the seed in plants which in the course of its development becomes the young plant. In the articles FŒTUS, IMPREGNATION, SEED, STIGMA, P. C., an account of the structure of this part of the plant has been given. Its origin, development, and functions have however been recently the object of investigation. In the early stages of the growth of the seed, it forms a mere projection from the side of the ovarium; this mass, which is composed of cellular tissues, is called the nucleus; as it develops itself, a distinct cavity is observed in its interior, which is called the sac of the embryo. After the contact of the pollen with the stigma, this sac disappears, and an embryo is found in its place. The principal points to which attention has been recently directed are, first, the determining cause of the growth of the embryo, and, second, the mode of its development. With regard to the first point, it is now well ascertained that the pollen, by means of its tubes, passes from the stamen to the pistil, and at last coming in contact with the ovule, produces the growth of the embryo. But the question still arises as to whether the pollen-tube becomes the embryo, or a portion of matter formed under its influence in the embryo sac. Schleiden, who must be ranked amongst the greatest physiological observers of the present day, says that if the pollen-tubes be followed into the ovule, it will be found that usually one, and rarely more, penetrates the intercellular passages of the nucleus and reaches the embryo sac, which being forced forward, is pressed and indented, and by its folding in forms the embryo in the first stage of its development. A bag is thus formed consisting of a double membrane, the indented embryo-sac and the membrane of the pollen-tube itself. Schleiden infers the identity of the embryo and the pollen-tube from the three following circumstances:—1, The constantly equal diameter of the pollen-tube when it is exterior to the embryo-sac and of the embryo when it is just within it. 2, The invariable chemical similarity of their contents shown by the reaction produced by the application of water, oil of sweet almonds, iodine, sulphuric acid, and alkalies. The general contents of the grain of pollen are starch, and this either proceeds unchanged downwards through the pollen-tube, or else passes along after being changed by a chemical vital process into a transparent and colourless fluid, which becomes gradually more and more opaque; and is coagulable by the application of alcohol: out of this, by an organising process, the cells are produced which fill the end of the pollen-tube, extending in Orchis Morio far beyond the ovule, and thus forming the parenchymen of the embryo. 3, The identity of the embryo and the pollen-tube is further supported by the fact, that in such plants as bear several embryos, there is always precisely the same number of pollen-tubes present as we find embryos developed.

These views of Schleiden, with his conclusion that the pollen-tube should be regarded rather as the representative of the female than of the male in the animal kingdom, have been adopted by Professor Wydler of Berne, who did not however observe the folding-in of the embryo-sac described by Schleiden.

On the other hand, observations have been made in France, by MM. Mirbel and Spach, on another class of plants, in which they did not meet with the structure described by Schleiden, and consequently they object to the general application of his conclusions. They examined the development of the ovule of the Zea Mays (common maize). In this plant there is no true embryo-sac, but they found the commencement of the embryo, which they call the primary utricle, and which Schleiden described as the result of an involution of the sac, existing in the cavity of the nucleus. In this plant also, only one, and not two membranes, as described by Schleiden, existed in the embryo. They also found in other plants the primary utricle existing in the interior of the embryo-sac, and at a period anterior to the act of impregnation. They therefore conclude that the pollen-tube does not become the embryo, and that no involution of the embryo-sac takes place. Their conclusions are probably as much too general as those of Schleiden.

Mr. Griffiths, in a paper recently published in the Linnean Transactions, gives the result of a long series of investigations on the development of the ovulum in the genera Santalum, Osyris, Loranthus, and Viscum. From his observations on these plants, which differ from those investigated by Schleiden, and Mirbel and Spach, he has arrived at conclusions somewhat different from those of any of these observers, and he carefully refrains from drawing an inference from the facts which he has observed that would apply to the whole vegetable kingdom. 'The first process,' he says, 'in the development of the seed subsequently to the penetration or application of the *boyau* (the pollen-tube) to the embryo-sac would, in Santalum, Osyris, Loranthus, and Viscum, appear to consist of the formation of cellular tissue. This may be applied, I believe, to most if not to all instances. This cellular tissue appears to have two different origins; one, and this is the earliest in development, being perhaps referable to the embryo-sac, while the other appears directly referable to the anterior *ends of* the pollen-tubes.' Thus far he agrees with Schleiden, *that the pollen*-tube penetrates into the embryonous sac, and
that the embryo is derived from its intruded e
observations on Santalum and Loranthus confirmin
whilst Osyris is an exception confirmative of the
none of my observations,' says Mr. Griffiths, 'hav
confirm Schleiden's idea of the inflection of the
before the pollen-tube; and it appears to me suffi
vious, that if such were the case the cylindrical
primary utricle of Mirbel), constituting the embry
stage of development, would consist of three m
layers, viz.: the first, or outer, of the ordinary and
membrane of the sac; the second, of its inflected p
third, that of the pollen-tube itself.' He also e
conviction that the primordial or primary utricle
Mirbel and Spach is the sac of the embryo, which
often and perhaps generally exists before fecundatio

Dr. Giraud, who is one of the latest observers o
ject, has published a paper in the same volume of the
Transactions. He made a series of observations
ovulum of the Tropæolum majus, and conducted his
with a perfect knowledge of previous investig
those of Mr. Griffiths, which, having been
were not published in England till after those of D
He concludes from his observations on the Trop
'that in this plant the primary utricle and the f
never have any structural connection with the
the pollen-tube at their first origin, or at any
period of their development, as is sufficiently obviou
fact that the pollen-tube is never brought into co
the embryo-sac. As the primary utricle makes
ance before impregnation has occurred, it cannot
that the organ has ever formed the extremity of
tube, as is believed by Schleiden and Wydler.
as the primary utricle takes its origin wholly
embryo-sac, and at the earliest period of its form
in contact with that membrane, it cannot have been
the pollen-tube pressing before it a fold of the em
its passage into the cavity of that structure, as Sc
maintained.' It is very obvious from the facts a
that botanists are not yet in a position to give a
pression for the origin and mode of development
bryo in the vegetable kingdom.

The function performed by the embryo during
is attended with different effects from those of th
growth of the tissues of the plant, and it has bee
described as a different process, under the name o
tion. When a seed is placed in a moist situation
warm, and with access to air, the following p
according to the researches of De Saussure, and
recent ones of Boussingault, take place:—1, ab
oxygen from the atmosphere; 2, a disengagem
bonic acid; 3, a disengagement of ammonia; 4,
of starch into dextrine, gum, sugar, &c.; 5, incre
—growth of the embryo.

All these phenomena were supposed to be co
the growth of the embryo, and the absorption of
the disengagement of carbonic acid gas were re
act of life and as necessary to the process of g
From this point of view germination and veget
growth of the plant, were stated to be antagonising
the one being a respiratory, an oxidating process;
a decomposing, a deoxidating process. At the sa
albumen of the seed was regarded as the sole source
ment for the growing tissues of the young plant. [
TION, P. C.] In a paper read at the meeting of t
Association, July, 1845, Dr. Lankester propose
theory of the phenomena of germination. It is ob
the only essential process of germination is the gro
young plant or embryo. The process of developm
embryo from primitive cytoblasts, is precisely th
that of every other part of the plant, and from an
structure Dr. Lankester inferred there must be an
function. But the ordinary theory of germinatio
different function to the tissues of the embryo from
other parts of the plant. This Dr. Lankester consi
cessary, and attributes the absorption of oxygen, an
engagement of the carbonic acid gas and ammon
result of the decomposition of the starch and pr
tained in the perisperm of the seed, whilst the gro
of the embryo appropriate the carbonic acid and am
water, just in the same way as all other cells in the
kingdom. The facts by which this theory is supp
which are not explained by the old theory are, as fo

1. In many plants there is little or no perisperm

developed, and the conditions required for germination hose of vegetation.

Many plants with horny and hardened perisperms, as the elephas macrocarpa, the Phœnix dactylifera, and species ecris, Cocos, and Astrocaryum germinate, without consum- ny appreciable quantity of the perisperm.

The quantity of carbonic acid obtained by De Saussure d not according to the number, but according to the mass f seeds, proving that it arose from the decomposition of starch as a chemical process, and not from the growth of mbryo as a process of life.

De Saussure found that the relation between the oxygen med and the carbonic acid gas given out was different erent plants, but this relation ought to be constant if eory of oxidation or combustion during germination be

Boussingault observed that the changes supposed to be r to germination went on in the perisperm after the plant had developed its radicle and plumule, and was of an independent existence.

he changes which take place in the chemical composi- the perisperm of the seed during germination can be ally produced by mixing starch and protein (diastase) er, and exposing them to the action of the atmosphere.

theory modifies the view which is mostly taken of of the albumen. It does not appear to be deposited y for the use of the young plant, but in many cases is an organ of support, and bears the same relation to nbryo that the wood of a branch does to the buds which upon it.

ther point of interest with regard to the function of nbryo has been lately discussed, and that is, the influence tricity on its development. A series of careful experi- have been lately conducted by Mr. Edward Solly. In er recently published, he says, 'Out of a series of 55 ments on different seeds, 20 appeared in favour of elec- , 10 against it, and 25 showed no effect whatever; and efully counting the whole number of seeds up in the series, there were found 1250 of the electrified, and of the non-electrified seeds up.' From these and other iments there can be little doubt that the asserted influ- of electricity on the germination and growth of plants en admitted on insufficient evidence, and that we have oof at present that electricity under any of its forms, artificially employed, exerts any influence on the growth utrition of plants.

ndley, *Introduction to Botany*, 3rd edition; Giraud, *Vegetable Embryology*; *Annals of Nat. Hist.*, 1840; *Transact.*, vol. xix. part 2; Griffiths, *On the Ovulum nthus*, &c.; *Linn. Transact.*, vol. xix. part 3; *Report h. Assoc.*; *Gardener's Chronicle*, July, 1845; Meyen, *zen Physiologie*, band iii.; Boussingault, *Rural Eco-* translated by Law.)

MPHYTEUSIS (ἐμφύτευσις). The term expresses in oman law a perpetual right to the enjoyment of land, ndition of paying annually a fixed sum (canon, pensio) to r person who was considered the owner of the land. relationship of occupier and owner was founded on t, which in the later empire received the name of tus emphyteuticarius. The occupier was called em- ta.

title of the emphyteuta depended on his paying what he ntracted to pay, and also all the taxes to which the ty was liable. If he neglected to pay these dues for years he might be ejected out of the land by the owner, t having any compensation for his improvements. He alienate the land after giving notice to the owner, who however, if he pleased, take the land at the price of the yteuta. If he did not, then the emphyteuta could sell it to rson who was able to answer all the demands to which the as subject by virtue of the contract. In each case the was bound to receive the purchaser as his emphyteuta, nfirm his title in due form, for which he could claim a nt not exceeding a fiftieth part of the price at which nd was sold.

e relation between the emphyteuta and the owner ated, as already stated, in contract. The owner could ake an emphyteusis by his will.

is kind of contract is first mentioned in the case of Agri gales, that is, lands which were leased by the Roman by towns, and by other corporations both civil and siastical. This Ager Vectigalis, which seems to be distinctly mentioned about the time of Hadrian, appears to have been formed after the analogy of the old Ager Publicus. The Digest is the oldest extant authority in which the term Emphyteusis occurs. The use and enjoyment expressed by the word emphyteusis were always carefully distinguished from ownership; the emphyteuta was a perpetual lessee who paid a perpetual rent to the owner.

The subject of the emphyteusis is discussed *Dig.* 6, tit. 3; *Cod.* 4, tit. 66; Mühlenbruch, *Doctrina Pandectarum*; Savigny, *Das Recht des Besitzes*, p. 99, &c. 5th ed.

EMPYE'MA (ἐμπύημα, from ἐν, 'in,' and πῦον, 'pus,' a word which signifies an internal collection of pus). Although this term was restricted by the antients to purulent collections in the thorax, it is now employed to signify all collections of fluid in the pleura which do not arise from an obstruction to the circulating system, and are not of a gaseous nature. In a natural state the pleura, like other serous membranes, secretes a clear fluid, which is removed by absorption as quickly as it is formed. But from the existence of inflammation or the presence of foreign bodies, other fluids often accumulate. The most common of these are serum, blood, pus, and fibrinous matter. Any of them may be present alone, or may be mixed in varying proportions. It is however almost impossible to ascertain by any external means the nature of the fluid which has accumulated. Dr. Townsend relates two cases of empyema: in the one, a case of two months' standing, produced by the bursting of a tubercular abscess in the lungs; on the fluid being removed, it presented all the characters of pus; in another case, arising from the same cause, a perfectly transparent and colourless fluid was found. It is therefore not only difficult to discover the nature of the fluid, but the same exciting cause may give rise to the presence of different kinds of fluid.

Whatever may be the nature of the fluid in the lungs, it always exists in conjunction with a peculiar state of the pleura. This membrane is covered over to a greater or less extent with a fibrinous secretion, which, in this and other cases becoming organised, constitutes what are known by the name of false membranes. This fibrinous matter is sometimes deposited in so large quantities on the pleura, which covers the lungs, that even after the fluid is removed, the lungs, which have been compressed, cannot expand, and consequently the parietes of the chest fall in and occupy the vacant space, and contraction of the chest is produced. The false membranes thus produced are liable to various diseases, and they may inflame, ulcerate, or become ossified, and thus produce various secondary diseases. Sometimes the false membranes extend from one side of the cavity of the pleura to the other, and a case is related by Dr. Townsend of a person 'in whom the effusion was divided by these partitions into three compartments, so perfectly distinct from each other, that had the operation of paracentesis been performed during life, that compartment only could have been evacuated into which the incision had been made; so that in order to draw off the entire effusion it would have been necessary to perform three several operations.'

The worst effect of the presence of fluid in the pleura is exerted on the lung. By its pressure the lung becomes incapable of expanding for the admission of air. Its position is generally by the side of the spinal column, but through the deposition of the fibrinous matter the pleura of the lungs and of the ribs often contract adhesions, and in this manner the lungs may be forced to occupy very varied positions in the cavity of the thorax. When the effusion is extensive the lung becomes flattened and flaccid, its surface is corrugated, and its tissue becomes soft, pliant, and dense, exhibits no crepitation, and is almost entirely deprived of blood. It does not often inflame in this state, but frequently becomes the seat of the deposition of tuberculous matter.

Empyema is always attended with inflammation acute or chronic of the pleura [PLEURITIS, P. C.], although the bursting of an abscess or the wounding of a blood-vessel may assist in producing the accumulated fluid contents of the pleura; at the same time it frequently happens that the inflammatory symptoms are of so mild and insidious a nature that they are entirely overlooked. This was more frequently the case previous to the use of percussion and auscultation than at the present day. It is in fact impossible by general symptoms alone to infer the presence of empyema. The following symptoms however, taken with the physical signs, may be regarded as characteristic:—Difficult respiration, increased by motion, exertion, and lying on the sound side; fulness and oppression at the chest; enlargement of the diseased side; protrusion of the intercostal spaces, with an obscure sense of fluctuation and œdema of the integuments; dulness of sound on percussion, and absence of the respiratory murmur on the diseased side, which remains perfectly motionless; noisy respiration in the opposite lung with violent action of the respiratory muscles; displacement of the heart; protrusion of the abdomen; a harassing short cough, small rapid pulse, and the other symptoms of hectic fever. To these symptoms some would add ægophony, a sound on speaking like the bleating of a goat, but this only occurs when there is a thin stratum of fluid in the pleura, and it is absent when the empyema is extensive. The intensity of all these symptoms is proportionate to the quantity of fluid effused, the duration of the disease, and the constitutional strength of the patient. The difficulty of breathing is in proportion to the quantity of the fluid which presses on the lungs. The inability to lie on the sound side arises from the pressure of the fluid upon the sound lung when a person lies so that its weight comes directly upon it. The cough is not a constant symptom, and may be entirely absent where there is no inflammation of the lungs or bronchiæ. The hectic symptoms will vary according to the strength of the individual and the duration of the disease. Night-sweats do not occur in conjunction with the other hectic symptoms in empyema, unless the lung is in a state of tuberculous ulceration.

There are few diseases with which empyema is likely to be confounded. Its general symptoms resemble those of tubercular phthisis, but the history of the disease, and more particularly the stethoscopic signs will point out the distinction. In phthisis there is no displacement of the heart; absence of the respiratory murmur is usually found at the upper part of the lung, and is followed by mucous râle, pectoriloquy, &c. Hepatization of the lungs has been referred to as likely to be confounded with empyema, but this is so rare a disease in a chronic form, as to render it unnecessary to point out the distinction between the two diseases here. The same remark applies also to tumors in the sac of the pleura, which, although they have been recorded, are too rare to need a description. Enlargement of the liver, with that organ pressing upon the diaphragm and lungs, might produce the same symptoms as in empyema, but a careful examination in connection with hepatic symptoms would soon indicate the diagnosis.

The treatment of empyema may be of two kinds, medical and surgical. The general principles on which the first should be conducted are those which would be applied in pleuritis [Pleuritis, P. C.] It however often happens that the resources of medicine fail, and that no other chance of relief can be offered the patient than that of drawing off the effused fluid by means of an operation. This is called the operation of empyema, or paracentesis thoracis. This operation, although in modern times it has got much into disrepute, was performed by Hippocrates (Hipp., 'De Morbis,' lib. ii. 576; Galen, 'Comment.,' Aph. 27) and the older practitioners of surgery, with apparently much success. It has recently been recommended, especially by Laennec, in cases of empyema which do not offer a chance of being cured by medical treatment. In such cases, where all other remedial means have been tried, there seems an increasing conviction that this operation may be had recourse to with every chance of benefit; and cases have now been recorded, both in the practice of the French and English hospitals, in which a large proportion of those operated on have recovered. Another class of cases in which paracentesis has been recommended, are those in which

the intercostal artery, which runs in a groove
edge of the upper rib. The size of the ope
pleura must be regulated by the nature of the
A canula, supplied with a stopper, should then
and kept in the wound, so that the whole or a p
may be drawn off.

(*Cyclopædia of Practical Medicine*, articl
Cooper, *Dictionary of Surgery; First Lines*

ENAMELLING. [Enamels, P. C., p.
is stated on the subject under the above head
few words upon the process which has been e
tised of late years of enamelling the interior
other hollow articles, such as saucepans and oth
domestic utensils. The superior cleanliness o
and the security which they afford against an
render them peculiarly valuable for some del
in cookery and confectionary, and for the prep
maceutical decoctions, extracts, &c.

A patent was obtained in 1799 for two mo
ing this process, by Dr. Hickling, of whose
Ure gives an abstract in the 'Supplement' to hi
Arts,' &c.; but though the manufacture of e
was carried on for some time under this pa
length given up, for want, it is said, of due
Dr. Ure, to whose work we are indebted for
this notice, also describes a process patent
Thomas and Charles Clarke, in 1839, for appl
lining less liable to crack or split off with th
than that commonly used. According to th
the vessels were to be first thoroughly cleans
them for three or four hours to the action of
acid, and then boiling them for a short time
The first enamel composition is then applied
100 lbs. of calcined ground flints, and 50 lbs. of
cined, and finely ground with the flint.
fused and gradually cooled, after which it is
water with the addition of one-eighth of its w
clay, until the mixture forms a mass of a p
'which will' (how is not stated) 'leave or
the inner surface of the vessel about one-s
thick.' This coat is set by placing the ve
room, after which, while it is yet moist, the s
composition is sifted finely and evenly over it
dry powder. This glazing composition consi
white glass (without lead), 25 lbs. of borax
soda (crystals), all pulverized together, vitr
ground, cooled in water, and dried. To 45
ture 1 lb. of soda is added. the whole being
gether in hot water, and when dry, pounded
sifting on the vessel as above stated. The
dried in a stove at a temperature of 212° F
quently heated gradually in a kiln or muffle
used for glazing china, until the glaze is
Sometimes the glaze-powder is again dusted
glaze, and fluxed a second time in the kil
manufacturers, having produced enamelled sau
lent quality, were sued by the Messrs. Clarke
of their patent rights; but the patentees we
the Court of Exchequer. From the evidence
appeared that the process of cleansing with sul
abandoned by the patentees, and that a good
saucepan might be made by Dr. Hickling's
1799. 'In fact,' observes Dr. Ure, 'the for

8° N. lat., and between 33° and 37° E. long. as more elevated than all the countries which hich is very probable, as it extends over the he rivers which flow northward and join the n branch of the Nile, and those which run ie large but little-known river called Goshop. of the country is a group of very high moun- eresa; on its northern declivity originate the ich joins the Abaï above the Melka Furi Ford C. S.] and the Maleg river, which also falls into much farther downward. The rivers which southern declivity of the Kheresa mountains Goshop. A great portion of the country is rests, in which several kinds of trees are found le fruits, and one of them is used for dyeing most remarkable of these trees is the coffee- indigenous, and met with in such abundance, s used as fuel. According to a tradition preva- , according to Niebuhr [Coffea, P. C., p. was brought to that country from Abyssinia: sive plantations of coffee have been found in odern travellers, it is very probable that it has ted from Enarea to Arabia, or perhaps from ouring country lying farther to the south, where in an indigenous state and in great quantity, than in Enarea. In these countries it attains ng between 12 and 14 feet. Elephants, gi- faloes are stated to abound, as well as some wild beasts. The civet (Viverra civetta) is so civet forms an important article of exportation. ported; but it is not known if it is collected in brought to it from some more distant part of apital of Enarea is Sakka, which appears to be place not far from the banks of the river Kibbe, by caravans which come from Basso and Gon- nia. These Abyssinian merchants bring to , which, under the name of Amolé, constitutes f the country; beads of different kinds, several cotton-goods, copper, daggers, knives, guns, tensils. They export from Enarea coffee, gold, and the skins of lions, panthers, black ntelopes; also ivory and horses. The inhabit- a belong to the widely-spread nation of the eir language is so similar to that which is tribes of the Galla subject to Shoa, that they another without difficulty. A small portion of and the royal family have been converted to the Mohammedan merchants who visit their who have introduced their creed into every part of Africa. But the larger number of the in- still heathens. It is said that among them a of Abyssinian Christians are found.

chte über die Verhandlungen der Gesellschaft zu Berlin; Isenberg's and Krapf's *Travels*

IC TILES AND PAVEMENTS. [Tiles ts, P. C. S.]

US, a genus of fossil Cycloid fishes, from the siz.)

RP. [Pistil, P. C. S.]

NITES, the name for certain fossil plant-stems, om Tilgate. (Mantell.)

IENT. [Dower, P. C.; Vicarage, P. C.]

[Alien, P. C.]

HISEMENT. [Copyhold, P. C. S.]

INGS. [Copyright, P. C. and P. C. S.]

EMENT OF OBJECTS. The mind forms f the apparent magnitudes of visible objects e angles subtended at the eye by their princi- ensions; but many circumstances render that neous, and create illusions respecting apparent which it is important to be aware.

ts are near a spectator the forms and colours of ually afford distinct perceptions of them; and rtion as the objects are more remote, the quan- eflected from them to the eye diminishes, the oth of outline and colour diminish in intensity. nctness of form and colour being in the mind h remoteness, when from any cause an object inct, and at the same time to subtend at the eye to that under which it is usually seen at a given imagined remoteness gives rise to a perception magnitude. It is thus that a well-known object, as a man, seen by night or through a fog, appears to be much greater than it would be if seen at an equal distance by day-light or in an atmosphere free from vapour. For a like reason, the image of a familiar object, as a man in dull-coloured clothing, when seen at a distance against a bright sky, seems greater than in other circumstances it would be at an equal distance; for the sensibility of the eye being diminished by the surrounding brightness, the object is obscurely seen.

The parts of space about a spectator extending indefinitely in every direction from the surface of the earth, and the human eye being incapable of appreciating differences between the distances of objects when those distances become great, it follows that, like as a long straight wall seen at a small distance from its front appears to be a circular arc, the figure of the sky must be, apparently, a portion of the concave surface of a sphere. Now, a series of objects beyond one another give indications of distance, and this a spectator may obtain on looking along nearly level ground towards the horizon; while the absence of intermediate objects between him and the part of the heavens above his head, whether the sky be unclouded or completely overcast, will lead him to imagine that the summit of the celestial vault is comparatively near him. Thus the apparent figure of the vault is a segment less than a hemisphere; the ratio of the vertical height to the semidiameter of the base being about as 1 to 3 or 4. It follows that a plane imagined to touch the surface of the visible heavens near the horizon would make with the latter an acute angle; and, if we form our estimate of the magnitudes of the sun and moon, or of the distances between stars, by their projections upon the face of the sky, it is evident that the projected disks or spaces will appear greater near the horizon than near the zenith, particularly in directions tending towards the zenith. This is conceived to be, in part, the cause of the apparent enlargement of the sun and moon, and of the distances between stars when viewed near the horizon, and the illusion is strengthened by the false judgment which is made of magnitude on account of the perception of a great distance horizontally. Some part of the effect, moreover, may be due to the diminution of the brightness of the celestial bodies on account of the light lost by the rays passing through the denser part of the atmosphere and the vapours in the horizon: small stress should however be laid on this circumstance, since, on looking at the sun or moon in the horizon through a tube which allows nothing but the celestial body to be seen, the illusion vanishes, though the diminution of tint remains. The apparent magnitudes in the horizon, when measured by a micrometer, are rather less than they are when observed near the zenith.

The visible magnitudes of luminous objects, as the sun, the moon, or the planets, are probably at all times greater than the geometrical magnitudes, on account of the imperfection of the eye: if a spectator who is very short-sighted look at the full moon, he will observe that the visible image is made up of a great number of moons surrounding, and partly overlaying one which appears to be in the centre, so that the diameter of the compounded image is more than double the simple diameter of the moon. A single image of the moon is apparently restored when such spectator places before the eye a concave lens of a certain curvature; but an enlargement of the disk still exists to a certain degree, probably, even for those eyes which are considered as in the most natural state.

An apparent diminution of the magnitudes of objects with which we are familiar takes place when they are seen in situations which lead us to consider them as nearer to us than they really are, and this may be exemplified by what is known to occur when men, horses, &c. in a street are seen from the top of a high building, or when a man standing on a high building is seen from the ground. The error of judgment may be rectified by frequently viewing such objects in the like circumstances, for it will at length be found that they appear in such situations as large as when viewed at equal distances on level ground. [Magnitude, P. C.]

ENTO'BIA, a genus of fossil Annelida. (Portlock.)

ENTOMOCO'NCHUS, a genus of fossil Crustacea, from the mountain limestone of Ireland. (M'Coy.)

EOCENE. The lowest of three great divisions of tertiary strata is thus termed by Mr. Lyell.

EPHEDRA (the Greek name of the Equisetum, which this genus closely resembles), a genus of plants belonging to the natural order Gnetaceæ. The species are diœcious; the male flowers are arranged in the form of a catkin, having a bifid calyx, and 7 stamens, 4 of the anthers of which are inferior, 2 superior; the female flowers have a quintuple calyx 2-parted, 2 ovaries, and 2 seeds covered over by the berried calyx. The species are not numerous, and are found in Europe, Asia, Africa, and America.

E. distachya has the sheaths of the joints 2-toothed, blunt, the catkins 2, opposite, stalked, the peduncles shorter than the catkins. It is a native of France and some parts of Germany, and abounds in the southern parts of Europe, and from thence eastwards to Persia and India. The berries, which consist of the fleshy calyx covering the ovarium, ripen in July and August. They have a sweetish taste, and contain a mucilaginous juice.

E. monostachya has the sheaths of the joints the same as the last, but the catkins either solitary or opposite, and the peduncles longer than the catkins. This plant is found in Hungary and Siberia, and in these countries the fruit is eaten as a great luxury.

E. altissima has clustered catkins and spreading branches, and is a native of Barbary. There is an American species found on the borders of Lake Michigan in the country of the Chippeway Indians. It bears a large fruit.

(Burnett, *Outlines of Botany*; Loudon, *Encyclopædia of Plants*.)

EPHE'MERA (ἐφήμερα, living for a day), a genus of Neuropterous insects belonging to the family of *Subulicornes* of Latreille. They have long, soft, tapering bodies, terminating in two or three long setæ. Their wings are placed nearly or quite perpendicularly. Their antennæ are very small and three-pointed. In the larva state they live in wet places or under water, and enjoy an existence of two or three years; but when they attain their final stage of metamorphosis and perfect form, they are among the most fleeting of living creatures, existing often only a few hours, and propagating their species before they die. In this state they sometimes appear suddenly in myriads, during fine summer evenings, by the waterside, where they may be seen flitting about and balancing themselves in the air, in the manner of gad-flies.

(Westwood, *Introduction to Entomology*, vol. ii.)

EPHRAEM or EPHRAIM ('Εφραίμ), an ecclesiastical writer of the fourth century of our æra, was probably born in the town of Nisibis, though some state that he was born at Edessa. The time at which he attained the height of his fame is about A.D. 370. In his early youth he entered the monastic life, and in seclusion he carried on his philosophical studies with zeal and success. But at a later period he seems to have become tired of solitary life, and feeling a strong desire to benefit others by the talent and knowledge which he possessed, he went to Edessa, whither the most distinguished Syrians came to receive his instruction. He soon became deacon of the church at Edessa, but declined accepting any higher ecclesiastical office, and when he was elected bishop and received the intelligence of it, he rushed forth into the market-place and acted in such a manner that the people thought he was out of his senses. He then absconded, until another had been appointed to the office of bishop in his place. He now went to Caesarea in Cappadocia, to see Basilius the Great, who formed the highest opinion of his learning and piety. Ephraem spent the greater part of his life in writing and preaching on devotional and moral subjects, and especially against the Arian heresy; but he was equally energetic whenever there was any occasion to show by his acts that he really was the benevolent man that he appeared to be. This was especially manifest at the time when Edessa was suffering from famine: he gave his assistance everywhere; he called upon the rich to help the poor, and he himself undertook the care of seeing that the poor received what was intended for them. He was looked up to with admiration and reverence by his contemporaries, who distinguished him by the honourable designation of 'the prophet of the Syrians!' He died about A.D. 378, having ordered in his will that no one should praise him, according to the common practice, in a funeral oration, that his body should not be wrapped up in costly robes, and that no monument should be erected on his tomb. An interesting life of Ephraem, though not free from marvellous stories, is contained in the 'Acta Sanctorum' (tom. i. Febr. p. 49, &c.; comp. Nyssenus, *Opera*, tom. ii. c. 60; Sozomen, iii. 16; Hieronymus, *De Scriptor.* c. 115; Photius, *Biblioth. Cod.* 196; and some other sources collected by G. Vossius, in the first volume of his edition of the works of Ephraem.

Ephraem was one of the most prolific writers of his time; he knew no other language than the Syriac, and was considered to surpass all his contemporaries in the
power of his oratory. Nearly all his works we
into Greek in his own lifetime, and their popu
great that in some churches they were publicly r
Scriptures. The Greek Church, down to this
him as a saint. According to Photius he wrot
a thousand orations, besides many hymns, poem
tises on a variety of theological, philosophical,
subjects, which are still highly esteemed by
Nearly all his works are extant, either in Syriac
and Arabic translations The first collection of t
published, though it is not complete, and only
translation, is that of G. Vossius, in three vols.
1586-97; reprinted at Cologne, 1603, and at Ant
The publication of this Latin translation creat
desire to see all the works of Ephraem, if not in
Syriac, at least in the Greek translations which w
the author's lifetime. This arduous task was u
Assemani, who intended to publish the Greek i
volumes, and the Syriac in three others. The
volumes, edited by Assemani himself, appeared
1732-46; and the last three, containing the Syriac,
by father Benedetti and Stefano Assemani. The
to this edition contain everything worth knowin
the life and writings of Ephraem.

(Cave, *Historia Literaria*, vol. i. p. 188, &c.
Biblioth. Græc. vol. viii. p. 217, &c., ed. Harles.)

EPILO'BIUM. [WILLOW-HERB, P. C.]

EPIME'DIUM, a genus of plants belonging t
order Berberaceæ or Berberideæ. It has a cal
duous sepals; 4 petals; 4 cup-shaped nectaries;
pod-like, many seeded. The species are herbs w
perennial roots and annual stems.

E. alpinum, Alpine Barrenwort, has no root-le
leaves of the stem twice ternate. It is a native o
other parts of Europe in subalpine coppices an
has been found growing in Great Britain in Cu
Yorkshire, but Mr. Babington remarks that it has
claims to be considered a native of England or S
flowers are red with yellow nectaries. The stem
inches high.

E. pinnatum is a native of Persia, and *E.*
the north-west of America. The first species i
vated and will grow in any common garden soil,
propagated by dividing the root.

(Babington, *Manual of British Botany*.)

EPIPACTIS, a genus of plants belonging t
order Orchidaceæ or Orchideæ, and to the trib
or Arethuseæ. It has the perianth patent, the li
the basal division concave, the terminal one
projecting plates at its base above; the stigma
the rostellum short, terminated by a globose ap
anthers terminal, erect, sessile, 2-celled, the
septa; the column short; the germen straight
stalk. There are two species of this genus f
Great Britain.

E. latifolia has ovate clasping leaves, the
longer than the flowers, the terminal division of t
with a minute point. Babington observes that t
or more very different plants included under th
habiting various parts of Great Britain. These ar
folia, with the terminal division of the lip round
obtuse, with a small recurved point. (b) *E. m*
terminal division of the lip triangular-cordate, a
as the lanceolate sepals and petals. (c) *E. pu*
the terminal division of the lip triangular-co
shorter than the ovate-lanceolate sepals and pe
ovalis, with the terminal division of the lip tran
and acute.

E. palustris has lanceolate leaves, bracts shor
somewhat drooping flowers, the terminal divisio
roundish, obtuse, crenate, as long as the perianth.
in Great Britain in moist places, and is not a rare

These plants will thrive in the borders on com
soil, and will also grow in pots with a mixture o
peat; they require but little water when not veg
may be propagated by division of the roots.

(Babington, *Manual of British Botany*; Loudo
pædia of Plants.)

EPIPHA'NIUS ('Επιφάνιος), a Greek ecclesias
was born in a village near Eleutheropolis in Pal
lived during the latter half of the fourth century a
We still possess two biographies of him, written b

Joannes and Polybius, but both are so full of fables that reliance can be placed upon them, and we shall here mention those particulars which appear to be well established. He is said to have been born of Jewish parents; but statement, as well as what we read about his education onversion, is more or less of a fabulous nature. When youth he went to Egypt, where he was ensnared by women to join the sect of the Gnostics, but he discovered position soon enough and escaped; and after having d the principles and the conduct of the Egyptian ascetics, turned at the age of twenty to Palestine, where, for time, he was instructed by Hilarion, the father of the tine monks. Afterwards he built a monastery near his village, and was for a time at the head of it, but in 368 he was made bishop of Constantia (formerly called is) in Cyprus, the metropolis of the whole island. g his residence there he acquired great celebrity by his ng, his writings, and the simplicity of his life. In A.D. was invited to Rome to give his vote in the case of us, bishop of Antioch. A few years after his return to s he became involved in a bitter and long protracted versy with Joannes, bishop of Jerusalem. The quarrel arried on with such vehemence, that once while Epius was preaching at Jerusalem against the views of Origen, es and his party received him with shouts of laughter decent gestures, and at length stopped the preacher in ermon. Similar scenes frequently occurred, and the r the enmity lasted the bitterer it grew: Epiphanius ed Joannes of entertaining the heretical opinions of Arius Origen, and Joannes retorted with other accusations st the private character of his opponent. Many letters efences were written by both parties, and their friends ll they could to bring about a reconciliation, but in vain; oannes entertained a morbid hatred of Epiphanius, until the lapse of several years he found that he was in the g, and was silenced by shame. But fresh contentions in another quarter. Theophilus, bishop of Alexandria, had expelled some monks from Egypt, on the ground of favouring the views of Origen, contrived to win Epiphaover to his side. The monks took refuge at Constantie, where they were received with distinction by Chryso-. Epiphanius forthwith convoked a meeting of the rian bishops, got them to condemn Origen and his works, ent letters in all directions to announce the condemnation. after he was prevailed upon by Theophilus to go to tantinople; but he refused to have any interview or comcation with Chrysostom, unless he would sanction the emnation of Origen and expel the Egyptian monks. ever, Epiphanius was soon obliged to quit Constantinople out having effected anything, for he was severely attacked Chrysostom for attempting to interfere with his episcopal s, and the empress Eudoxia too was not favorably disposed rds Epiphanius. On parting, the two bishops are said to taken leave by wishing each other all kinds of evils, and deity, say the writers of the time, granted their wishes; Chrysostom was deposed soon after, and Epiphanius died oard the ship which was to carry him to Cyprus, in A.D. . He was then nearly one hundred years old, and had Bishop of Constantia for thirty-five years.

piphanius is described as a man of very great piety, and ned with all the virtues of a Christian: the opinion of anctity was so great in Cyprus, that a church was built e in honour of him, as early as A.D. 647. He wrote and e with equal facility Hebrew, Syriac, Egyptian, Greek, Latin, and was especially versed in the history of the ch, though he seems to have been a very credulous historand careless in his chronology. Photius says that he very weak in conducting a controversy, and his language ch as might be expected of a man who paid no attention egance and refinement,—it is plain and homely in the est degree. (Lives of Joannes and Polybius in Pata- edition of Epiphanius, vol. ii. p. 318, &c.; Socrates, *Eccles.* vi. 10; Sozomen, viii. 14; Hieronym. *Opera,* ii. p. 309, *De Scriptor.* 114.)

iphanius was the author of a considerable number of s, many of which have come down to us, but some of are lost. Among those still extant there are several h are of a doubtful nature, and are ascribed by most siastical historians to a person of a much later date, who have borne the name of Epiphanius, and so have caused the sion. The most important among the extant works are Ancoratus' ('Αγκυρωτός), that is, the anchor of faith against heresies of the time, especially the Macedonian. Epiphanius's main object is to establish the Catholic doctrine of the Trinity and of the Holy Ghost. 2, 'Panaria' (Πανάρια), that is, a repository of remedies against the eighty heresies which he enumerates. It consists of three books, and was commenced in A.D. 374, at the request of Acacius and Paulus. Photius (*Bibl. Cod.* 122) states that this work contains a more full and useful account of all the heresies than any other, and that it contains everything that earlier writers had said against those heresies, together with many useful observations of Epiphanius. The author himself published an abridgment of this work under the title of 'Ανακεφαλαίωσις, which is still extant. The first edition of these and a few other works appeared at Basel, 1544, fol. A Latin translation had been published at Basel in 1543, fol., and was afterwards often reprinted with some additions which are not in the first edition. The best edition of all the works of Epiphanius (the Greek original with a Latin translation) is that by Dionysius Petavius, Paris, 1622, 2 vols. fol., which was reprinted with some additions at Cologne, 1682, 2 vols. fol.

(Cave, *Historia Literaria,* vol. i. p. 184, &c.; Fabricius, *Biblioth. Graec.* viii. p. 255, &c.)

EPIPHE'GUS (from ἐπὶ, upon, and φηγός, the beech, because the plant is parasitical on the roots of the beech), a genus of plants belonging to the natural order Orobanchaceæ. It has the sterile flowers perfect, and the fertile flowers imperfect; the calyx short, 4-toothed; the perfect corolla 2-lipped; the upper lip emarginate, the lower 3-toothed; the imperfect corolla slender, 4-toothed, deciduous; the stamens as long as the corolla; the filaments smooth; the anthers 2-lobed, acute at the base, valveless, dehiscent in the middle; the stigma capitate, and somewhat emarginate; the capsule gibbous compressed, half 2-valved with four diverging placentæ. There is but one species, the *E. virginiana.* It is found parasitical on the roots of beech-trees in the southern States of the American union, where it is called 'Beech drops.' It is the *Orobanche virginiana* of Linnæus. It is a smooth fleshy branching plant, growing from six to eighteen inches high, and clothed with small scales instead of leaves. The corolla is purple streaked with white. The capsule dilates after it opens into the shape of a cup. There is in North America a quack medicine called 'Martin's Cancer Powder,' which consists of equal parts of this plant and white arsenic. It is said by some writers to have a really beneficial effect.

(Lindley, *Flora Medica;* Don, *Gardener's Dictionary.*)

EPISTAXIS (from ἐπίσταξις, a dropping, bleeding of the nose) is the term used by most nosologists to indicate bleeding from the nose, which essentially consists in an effusion of blood externally from the pituitary membrane. There are few parts of the body more liable to hæmorrhage than the lining membrane of the nose. The blood-vessels which supply this membrane are branches of the common carotid arteries, and the blood is returned from the membrane by veins which join the external jugular veins. Blood may flow from the nose under very varying circumstances; sometimes when the system is in a state of plethora, and at others when in a state of debility. When it occurs in plethoric persons it is usually preceded by pain in the head, vertigo, or drowsiness, frightful dreams, increased heat of one side of the face, injection of the eyes, flashes of light before the eyes, increased beating of the temporal arteries, deafness, &c. These symptoms will be present, more or less intense, according to the general condition of the sufferer. This active form of the hæmorrhage comes on in the course of many diseases, as the inflammatory forms of fever, inflammation of the brain, lungs, &c. Where the bleeding comes on in a state of debility it is called passive, and may make its appearance without any premonitory symptoms. This form comes on in the course of low and malignant fevers, and various diseases which come on in a cachectic state of the body.

Bleeding at the nose, when it occurs alone, most frequently comes on in children. After ten or twelve years of age it is oftener seen in boys than girls. It is frequently hereditary, and whole families exist who are liable on slight causes to bleed at the nose. It may be brought on by whatever increases the flow of blood to, or retards the flow of blood from, the head. Thus, mental excitement, anger, shame, protracted study, stooping, sneezing, deep sighing, hallooing, singing, coughing, tumors on the veins, tight neckcloths, &c., may all be exciting causes of the bleeding. Whatever causes absolute or relative plethora, as too free living, the suppression of accustomed discharges, whatever interferes with the free circulation of the blood, as tight clothes, whatever determines the blood to the surface of the body, as diminished pressure of the atmosphere, as in ascending mountains, a highly heated atmosphere, &c., will also produce it.

Bleeding at the nose is not in itself a dangerous disease. It may however come on in states of the body when the system is already exhausted, and be the forerunner of a fatal result. But in inflammatory diseases, and where the person is plethoric, it is frequently a relief to the system, and is followed by a diminution of painful symptoms. In persons, however, after middle age, and who are inclined to plethora, this symptom should be looked upon as indicative of congestion, which may proceed further, and the warning should be regarded, and a diminution in the indulgences of the table insisted on.

In the treatment of bleeding from the nose regard must be had to the state, age, &c. of the patient. When it occurs in children, and in the great majority of simple cases, all that is required is to make the patient assume the sitting posture, and hold the head backwards; cold should be applied to the face, and a piece of cold metal placed between the nape of the neck and the clothes. Acid drinks may be given at the same time. When the person is plethoric and has suffered much pain in the head, singing in the ears, &c., previously, it will not be adviseable to stop the bleeding until these symptoms are relieved. This may be followed by the exhibition of purgatives; and bleeding from the arm should be had recourse to if the head symptoms continue. When the bleeding follows the stoppage of any natural discharge, this latter should be restored. Cupping on the nape of the neck, or even dry cupping, may be recommended in these cases. But in the passive states of the system it is frequently desirable to avert the bleeding without loss of time. Under these circumstances astringents should be applied immediately to the pituitary membrane. A solution of the acetate of lead, of the sulphate of zinc, of iron, of copper, or of alum, may be injected up the nostrils, or a dossil of lint wetted with the solution thrust up the nostril. The various preparations of tannin, as catechu, kino, &c., may be employed in the same manner. These astringents may also be administered internally with small doses of opium. One of the most effectual means however of arresting hæmorrhage from the nose is plugging the posterior nares, which may be done by introducing a piece of sponge or lint upon a ligature into the mouth, and carrying it through the nares to the nostril in front. This generally exercises sufficient pressure to arrest the bleeding.

(Copland, *Dictionary of Medicine; Cyclopædia of Practical Medicine*, article Epistaxis.)

EPROUVETTE is an apparatus consisting of a gun or mortar suspended from a horizontal axis for the purpose of determining the strength of gunpowder by the recoil of the piece when a charge is fired in it. Mr. Robins (*New Principles of Gunnery*) first proposed the employment of such a machine, but Dr. Hutton, of Woolwich, afterwards considerably improved its construction.

The gun or mortar is fixed, near its centre of gravity, to the lower extremity of an iron rod, which may be about seven feet six inches long, and its base is attached by a short brace to an arm which projects from the rod, an adjusting screw being provided for the purpose of keeping the axis of the bore perpendicular to the same rod. Sometimes however a frame of iron, like the letter A, serves to suspend the gun, which is then fixed, at two places, in collars at the lower extremities of the frame. To the upper part of the rod or frame is attached a horizontal axle of steel, about which the gun is to vibrate; and each extremity of this axle rests in a socket at or near the top of the frame which constitutes the stand or support of the gun and its suspending apparatus.

From the lower side of the gun projects downwards a rod or style of iron, which is pointed at its lower extremity, the point being in a line drawn from the middle of the horizontal axis of suspension through the centre of gravity of the gun. Under the latter, and resting on the ground, is a block of wood in the upper surface of which is cut a groove, in a vertical plane, in the form of a portion of a circle whose centre is at the middle of the axis of suspension; and this groove being filled with soft wax, the point of the rod projecting below the gun, in the recoil of the latter, scratches on the wax a circular arc: the measure of this arc gives, of course, the angle of the recoil.

Instead of this pointed rod and grooved block, a quadrant of brass of any convenient radius, as twelve inches, is fixed in a vertical position to the rod or frame which carries the gun,
the horizontal axis of suspension passing through it
the quadrant, whose arc is graduated, vibrates with
and an index at the extremity of a bar on that axis r
rest till the gun has recoiled as far as the force of
gunpowder can impel it; when, by a contrivance, it i
to return with the quadrant, showing, by the degre
cidence with it, the extent of the recoil.

In the Eprouvette constructed by Dr. Hutton, the
had on it three graduated arcs: one of these sh
degrees in the angle of recoil; another showed by i
the length of the chord: and the third showed in lik
the length of the versed sine of the arc of recoil.

In using the instrument, the gun or mortar is cha
a given quantity of powder, which is introduced i
cartridge; and is fired, when exactly in a horizontal
by means of a piece of quick match: the extent of
recoil is then to be measured or read.

The velocity acquired by a body on describing hal
tion in a circular arc varies (by mechanics) with t
root of the vertical height, or with the chord of
vibration: hence, if by the explosions of equal c
different kinds of powder in a suspended gun, the
made to recoil from a vertical position through arcs
which are measured in degrees, the velocity resulting
force which produced the recoil being equal to that
gun would have acquired in descending by gravity
upper extremity to the lowest point of the arc; it fol
the chords of those arcs or angles will express th
velocities produced by the different kinds of powder.
by mechanics, the forces are as the squares of the
and these, when produced by a body descending
arcs, are as the versed sines of the arcs; therefore t
of recoil, or the half vibrations, being found from t
ments, their versed sines will express the relative
the different kinds of powder.

A gun suspended in the manner above described
employed, instead of the ballistic pendulum, to dete
its recoil, the initial velocity of the shot fired from
given charge of powder. [BALLISTIC PENDULUM,

EQUALITY, APPROACH TO. As a gen
that which may be stated as absolutely true when a
is true, may be stated as nearly true when that
only nearly true. Usage of words however is apt
mistake when it is equality, and nearness to equal
are in question: A and B are absolutely equal when
the following equations is true; one of them being
a consequence of the other:

$$A - B = 0 \qquad \frac{A}{B} = 1$$

and it is usual to say that a *small* quantity is *near*
or *near to nothing*. In strictness, we might as we
a large quantity is near to infinity, as that a small
near to nothing: both infinity and nothing are limit
except only as to the latter, when obtained by su
[INFINITE, P. C.] Nevertheless we can hardly ha
lish the common idea of small quantities being
nothing: we must therefore guard those who
phraseology from the mistake to which it very
leads.

It is not true that quantities are necessarily ne
when their difference is near to nothing (meaning
by small we here understand small with respect to
tities themselves, it is true; but not otherwise. I
a small fraction of A, let it be mA, where m is a
tion of unity; then $A - B = mA$ gives

$$\frac{B}{A} = 1 - m$$

or B and A are in the ratio of $1-m$ to 1, nearly that
But if A and B be both small, their difference is
yet that difference may be itself many times greate
smaller of the two quantities from which it was obta
the bulk of the sun be unity, the earth and moon
small fractions; but not nearly equal. When the
want to think of approach to equality, we must re
proach to

$$\frac{A}{B} = 1, \text{ not to } A - B = 0$$

We are here merely guarding a phrase, not explaini
ciples at length. In the articles INFINITE; LIMIT
TIONS, VANISHING, P. C., will be found the ele

per attention to which will secure the beginner

person, for any common purpose, speaks of a small
next to nothing, he compares it with the whole
hich it is taken, and he always means by small
is a small fraction of an important quantity. The
and great being purely relative, may have many
different circumstances; but with that we have
g to do. Whatever *small* may mean, we have no
that quantities of small difference are nearly equal,
when the relative word small may be properly
tion to the quantities themselves.
caution is the more necessary to the young mathe-
om his frequently meeting with the words small
n an absolute sense. Though this absolute use of
is only an abbreviation [INFINITE, P. C.], he
it care, now and then forget that it is so.

ION, BINOMIAL. A binomial equation is an
equation of two terms. Its form is therefore
0, all the consideration of which may easily be re-
it of one or other of the forms $x^n \pm a^n = 0$ (n being
least if we confine ourselves to equations in which
all real quantities. All that is necessary is given
e ROOT, P. C., so that we shall here confine our-
h statement of the mode of resolving $x^n \pm a^n$ into
ay be useful for reference.

o $x^n - a^n$. Of this $x-a$ is always a factor, and if
$+a$ is also a factor. The remaining factors are
rm

$$x^2 - 2\cos\theta .\ ax + a^2$$

may be either the quantity $\frac{2\pi}{n}$ or any multiple of
n. Thus whether n be 10 or 9, we go as far as
$\pi \div n$, since 4 is the integer next less than the half
or 9. According, if $\frac{2\pi}{n} = \nu$, and if k be the in-
ess than the half of n, we have

$$\begin{aligned} x^n - a^n = & (x-a) \\ & \times (x+a, \text{ if } n \text{ be even}) \\ & \times (x^2 - 2\cos\nu .\ ax + a^2) \\ & \times (x^2 - 2\cos 2\nu .\ ax + a^2) \\ & \times \ .\ .\ .\ .\ .\ .\ . \\ \text{up to } & \times (x^2 - 2\cos k\nu .\ ax + a^2) \end{aligned}$$

to $x^n + a^n$. Of this $x+a$ is a factor if n be odd:
aining factors are of the above form, θ being $\frac{\pi}{n}$
multiple of it which does not equal n. Thus
e 10 or 11, we go as far as 9 times $\pi \div n$, since
odd integer which does not equal either 10 or 11.
$\pi \div n$, and k be the last odd number which does
we have

$$\begin{aligned} x^n + a^n = & (x+a, \text{ if } n \text{ be odd}) \\ & \times (x^2 - 2a\cos\nu .\ ax + a^2) \\ & \times (x^2 - 2a\cos 3\nu .\ ax + a^2) \\ & \times (x^2 - 2a\cos 5\nu .\ ax + a^2) \\ & \times \ .\ .\ .\ .\ .\ .\ . \\ \text{up to } & \times (x^2 - 2a\cos k\nu .\ ax + a^2) \end{aligned}$$

onnected with the binomial equation is the trino-
n—

$$x^{2n} \pm 2\cos\lambda .\ a^n x^n + a^{2n} = 0$$

d side of which is thus reduced:—

$x^{2n} - 2\cos\lambda .\ a^n x^n + a^{2n}$ the factors are—

$$x^2 - 2\cos\frac{\lambda}{n} .\ ax + a^2$$

$$x^2 - 2\cos\frac{\lambda + 2\pi}{n} .\ ax + a^3$$

$$x^2 - 2\cos\frac{\lambda + 4\pi}{n} .\ ax + a^2$$

to

$$x^2 - 2\cos\frac{\lambda + \overline{2n-2}\pi}{n} .\ ax + a^2$$

$-2\cos\lambda .\ a^n x^n + a^{2n}$ the factors are—

$$x^2 - 2\cos\frac{\lambda + \pi}{n} .\ ax + a^2$$

$$x^2 - 2\cos\frac{\lambda + 3\pi}{n} .\ ax + a^2$$

$$x^2 - 2\cos\frac{\lambda + 5\pi}{n} .\ ax + a^2$$

and so on up to

$$x^2 - 2\cos\frac{\lambda + \overline{2n-1}\pi}{n} .\ ax + a^2$$

For the *algebraical* solution of binomial equations, see the works of Gauss or Legendre on the theory of numbers, or Murphy's *Theory of Equations* (L. U. K.).

EQUATION, PERSONAL. It is a fact which has now been for some years established, and which might reasonably have been suspected, that different persons, attempting to observe the precise moment of a phenomenon, by means of a clock which beats seconds, do not agree exactly in their results, but differ generally in one and the same way, one of the observers being almost always a little before the other in the moment which he assigns to the phenomenon. If this had not been the case, if one of the observers had been about as often before the other as behind him, the difference could only have been considered as simple casualty. But, looking upon the constant occurrence of a difference of one kind between two observers, it becomes obvious that the cause is in the organs of the men themselves; and that physical constitution, temperament, habit, &c., make differences between one person and another.

Personal equation is a name given to the quantity of time by which a person is in the habit of noting a phenomenon wrongly; and it may be called positive or negative, according as he notes it after or before it really takes place. Thus if A and B are severally in the habit of noting events 3-tenths of a second after and 4-tenths of a second before they take place, their personal equations may be described as being + 0ˢ.3 and 0ˢ.4.

The absolute personal equation of any one is a thing undiscoverable; since we can only refer one human observer to another, and note the difference of their times of observing the same phenomenon. If we could cause a thousand persons to note a given definite phenomenon by one clock, and if we could take the mean of all their results, we might say that there is very strong reason to presume that the mean is the time which perfect organs would have noted: for we may think that the chances are much in favour of human imperfection being, in the mass, as much of one kind as of the opposite. But a little consideration will show that this reasoning is not to be relied on. It may be that the whole race has, by its constitution, a rather large personal equation of one or the other kind: for we can only see the differences, without knowing upon what quantities they are differences. This question is, however, practically immaterial; for any given amount of personal equation common to the whole race is equivalent to making all the clocks wrong by the same quantity. Suppose, for example, that every person suddenly received an addition of one second to his personal equation, or began to note phenomena a second later. The astronomers would then begin to find the clocks a second too fast, in comparing observation with prediction; as soon as the clocks had been rectified every thing would be as before.

The first notice we have of personal equation is in an announcement by Maskelyne, in the volume of Greenwich Observations for 1795. He tells us that he was obliged to part with one of his assistants, because the latter, who had till then always agreed with him in his observations, suddenly began, in August, 1794, to observe half a second later: and that in January, 1796, the difference amounted to 8-tenths of a second. Maskelyne inferred that his assistant had contracted some bad habit of observation: it is now very well known that age causes persons to observe later than they did before, though it is not usual for the habit to undergo such sudden changes as in the above case. In 1823 Mr. Bessel, at Königsberg, ascertained that he was in the habit of observing phenomena as much as 1ˢ.22 before his assistant Mr. Argelander. The latter left his post to take charge of the observatory at Bonn: but, passing through Königsberg in 1832, Mr. Bessel took the opportunity to make some further comparisons with him; and it was found that the above quantity was reduced to 1ˢ.06. Age had brought them nearer together. A close trial of the subject was made by MM. Quetelet and Sheepshanks, 1838-1841, in determining the longitude of Brussels by transmission of chronometers between that place and Greenwich. This method of course requires the most careful transit observations at both places, and the personal equation * becomes of considerable importance. It was necessary that some observer should compare himself with M. Quetelet at Brussels, and with the assistants at Greenwich. This was undertaken by Mr. Sheepshanks, and the result ascertained was, that he came, one observation with another, 45-hundredths of a second behind M. Quetelet, and 27, 35, and 24 hundredths before MM. Main, Henry, and Ellis, severally. The result was that the longitude of Brussels was found to be three quarters of a second less than it would have been supposed to be if the difference of personal equations had been unknown. (See a memoir on the difference of the longitudes of Brussels and Greenwich, by MM. Quetelet and Sheepshanks, *Mém. de l'Acad. Roy. de Bruxelles*, vol. xvi.)

EQUATIONS, DIFFERENTIAL, and EQUATIONS OF DIFFERENCES. The plan we shall follow in this article is that of Theory of Equations, P. C., in which a synopsis of results is given, such as may be useful to the advanced student, as a guide to his reading, or for reference. We have not room either to teach the subject or to illustrate it by examples. We may refer to the following works:—Moigno, 'Leçons de Calcul Differentiel,' &c., vol. ii. Paris, 1844, 8vo.; De Morgan, 'Differential and Integral Calculus,' London, 1842, 8vo. (Lib. U. K.); various numbers of the 'Cambridge Mathematical Journal,' Cambridge, 1839-1845, 8vo., a work which has at this time (August, 1845) reached the end of the fourth volume and of the twenty-fourth number; Brooke, 'Synopsis of the .. Formulæ .. of Pure Mathematics,' Cambridge, 1829, 8vo.; Peacock, Herschel, and Babbage, 'Collection of Examples,' &c., Cambridge, 1820, 8vo.; Gregory, 'Examples of the Differential Calculus,' Cambridge, 1841, 8vo. We must confine ourselves to a selection from striking points, or our article would exceed all reasonable limits.

1. Let there be a function $\phi\,(x, y, a, b, c \ldots)$, or ϕ, containing the variables x and y and the n constants, $a, b, c, \ldots$ If we make $\phi = 0$, we tacitly require that y should be a function of x. If between $\phi\,(x, y \ldots) = 0$, and the result of complete differentiation, $\phi'\,(x, y, \ldots) = 0$, we eliminate one of the constants, we get a new equation containing x, y, y' (or $dy : dx$) and all the rest of the constants; and according as we eliminate one or another constant, we have one or another of as many such equations as there were constants. These are called differential equations of $\phi = 0$, and they are said to be of the *first order*.

2. The word *order* refers to the number of differentiations, the word *degree* to the highest power of the highest differential coefficient which enters. Thus $y''^4 + y'^5 = x$ is a differential equation of the second order and the fourth degree. Let the accents always denote complete differentiation with respect to x. For partial differentiation we shall save room by writing as follows:—ϕ'_x for $\frac{d\phi}{dx}$, ϕ'_y for $\frac{d\phi}{dy}$, &c.

3. If we eliminate two of the constants between $\phi = 0$, $\phi' = 0$, $\phi'' = 0$, we have a differential equation of the second order, and so on; there are altogether $\frac{1}{2}\,n\,(n-1)$ differential equations of the second order, if we have n constants. And generally, when there are n constants, there are as many differential equations of the mth degree as there are ways of taking m out of n things. Thus there is only one equation of the nth degree.

4. If there be a system of p equations between $p+1$ variables, so that p of the variables are functions of the remaining one, and if we differentiate each equation once, we can eliminate p constants, and form p equations of the first order. With p second differentiations, we can eliminate p other constants, and so on. And if there were $p+q$ variables, we should have similar systems with q independent variables.

5. Equations of differences are formed in a corresponding way by taking differences instead of differential coefficients. Thus, suppose u_x means u, a function of x, and $\phi\,(x, u_x, a) = 0$ Change x into $x + \Delta x$, usually into $x + 1$, and let u_x then become u_{x+1}, or $u_x + \Delta u_x$. If we eliminate a between $\phi\,(x, u_x, a) = 0$ and $\phi\,(x+1, u_{x+1}, a) = 0$, we have an equation of the form $\psi\,(x, u_x, u_{x+1}) = 0$, or $\psi\,(x, u_x, \Delta u_x) = 0$, as we please, and this is an equation of differences of the first order. But exactly the same equation would be obtained, if

for a we had substituted any function of cos (
cos $(2\pi x \div \Delta x)$. On this point see Invariable.

6. When there are more than two variables,
is possible to form an equation in which an arbitr
of a definite function of two of them shall be
Thus, if $\phi\,\{x, y, z, \psi a\,(x, y)\} = 0$, in which z
of x and y and $a\,(x, y)$ a given function; we
with respect to x and y separately, and produce
tions involving $x, y, z, z'_x, z'_y, \psi a\,(x.y)$ and
From these three eliminate the two last, ψ and
get an equation involving only x, y, z, z'_x, z'_y
forms. This is called a partial differential equati

7. The analogies between the constants of a
ferential equation and the arbitrary functions of
must not be relied on as capable of being carried
It is not, for instance, universally true that tw
functions may be completely eliminated by differ
the second order.

We now consider common differential equation
order.

8. Let $y = \phi\,(x, c)$, and $y' = \phi'\,(x, c)$, and let
give $y' = \chi\,(x, y)$, the differential equation. T
other mode of arriving at the same result. Let y
give $c = \Phi\,(x, y)$, or $0 = \Phi'_x + \Phi'_y \cdot y'$. The c
disappears by mere differentiation, and $\chi\,(x, y)$ m
tical with $-\Phi'_x : \Phi'_y$.

9. The difficulty of returning to the primiti
equation $y' = \chi\,(x, y)$ consists in that of reducin
form $\Phi'_x + \Phi'_y . y' = 0$. Generally speaking, com
are made to disappear, and the restoration of
is a problem of exactly the same difficulty as th
the equation.

10. The quantity $P + Qy'$, P and Q being funct
y, is integrable at once when $P'_y = Q'_x$. When th
which is usually called the criterion of integrabi
fied, the integral is

$$\int P dx + \int \left(Q - \frac{d}{dy} \int P dx \right) d$$

in which y is constant in the first integration, a
second. Any arbitrary constant may be added.
following forms are also integrals of $\psi\,(x, y) \div$
if the criterion be satisfied.

$$\int_a^x \psi\,(x, y)\,dx + \int_b^y \chi\,(a, y)\,dy$$

$$\int_b^y \chi\,(x, y)\,dy + \int_a^x \psi\,(x, b)\,dx$$

11. The equation $y' = \chi\,(x, y)$ can have no ot
with an arbitrary constant, except $y = \phi\,(x, c)$
it was derived. But it may have another soluti
not an arbitrary constant, or even more than on
called singular solutions. A singular solution ma
χ'_y infinite if y be substituted from it in terms o
makes Φ'_x and Φ'_y infinite in the same manner.

12. The singular solution may also be fou
primitive $y = \phi\,(x, c)$, as follows. Eliminat
$y = \phi\,(x, c)$ and $0 = \phi'_c\,(x, c)$, the result is
solution. This rule and the last are subject
when the singular solution takes the form $x =$
$y =$ constant.

13. The geometrical character of a singular
follows. If $y = \phi\,(x, c)$ be the equation of
curves, that is, of one curve for each value of
ferential equation $y' = \chi\,(x, y)$ also belongs to e
of that family. The singular solution is the ex
curve which touches every one of the family of

14. The equation $y = y'x + \phi\,(y')$ is historic
able as having led to the theory of singular s
is called *Clairaut's form*. The complete p
$y = cx + \phi c$, belonging to a family of straigh
singular solution is found by eliminating c betw
$x + \phi' c = 0$.

15. It is not often that the factor which makes
integrable can be recovered in any general form.
the solution is obtained, it can always be found:
use of it is to find the solution. There is alway
number of such factors, any one of which will
in $P + Qy'$, the criterion $P'_y - Q'_x$ is not $= 0$, ye
function of x only, and if $\int Q^{-1}\,(P'_y - Q'_x)\,dx$
$\varepsilon^V\,(P + Qy')$ is integrable.

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* It is usual to call the difference between two observers the personal equation: but this ought to be called the difference of their personal equations, or *their personal difference*. The personal equation of an observer is, properly speaking, the difference between him and the average of the human race.

quation $y' + \mathrm{P}y = \mathrm{Q}$, in which P and Q are only, is always integrable. The factor of in- $^{\mathrm{P}dx}$, and the complete integral is

$$=\epsilon^{-\int \mathrm{P}dx}\int \mathrm{Q}\epsilon^{\int \mathrm{P}dx}\,dx + c\,.\,\epsilon^{-\int \mathrm{P}dx}$$

$y' = \mathrm{P}y + \mathrm{Q}y^2$ is reduced to the preceding ing $y = z^{-1}$; and $y' = \mathrm{P}y + \mathrm{Q}y^n$ by making

P and Q are homogeneous functions of x and y, are both of the form $x^n\,\phi\,(y:x)$, with the f n, the integrating factor is $(\mathrm{P}x + \mathrm{Q}y)^{-1}$. the following method is more convenient.

$$\phi\,(x:y) + \psi\,(x:y)\,.\,y' = 0$$

$= u$, from whence

$$\frac{dx}{x} = -\frac{\psi u du}{\phi u + u\psi u}$$

non integration can be applied. The equation d to one in which the variables are said to be

rdly necessary to say that the variables can be eparated in $\mathrm{P} + \mathrm{Q}y' = 0$, whenever P and Q e form $\phi x \times \psi y$.

n happens that, when direct processes would evious solution of an equation of indefinite form, sses will succeed in reducing the question of e of elimination. Thus $x = f\,(y')$ is solved ninated between this and

$$y = y'fy' - \int fy'\,dy' + c$$

solved when y' is eliminated between it and

$$= x'f\left(\frac{1}{x'}\right) - \int f\left(\frac{1}{x'}\right) dx' + c$$

s $1 : y'$.

ation $y = x\,\phi y' + \psi y'$ can be reduced to elimi- Let $y' = z$, then

$$\frac{dx}{dz} - \frac{\phi' z}{z - \phi z}\,x = \frac{\psi' z}{z - \phi z}$$

e form integrated in § 16. Eliminate z between his and $y = x\phi z + \psi z$.

uation $y = \phi\,(x, y')$ can be reduced to a form egree and elimination. Let $y' = z$, then $z =$ re P and Q are $\phi'_x\,(x, z)$ and $\phi'_z\,(x, z)$. If can be integrated, we eliminate z between the $= \phi\,(x, z)$. The form $x = \phi\,(y, y')$ may be nilar manner. Or generally, let the equation $) = 0$, $\phi\,(x, y, z) = 0$, which gives by differ- rm $\mathrm{P} + \mathrm{Q}z + \mathrm{R}z' = 0$. If from this we y substitution from the preceding, we have an e first degree as to z', from which, if integration imination will determine the relation between

substitutions will sometimes aid in the solution , as $y = ux$, $y = u^{-1}$, $y = u^m$, $y = \epsilon^u$, and so s, when a couple of expressions of the form $a'x + b'y + c'$, occur, it will be convenient to new variables derived from equating the pre- $+ \mathrm{B}w$ and $\mathrm{A}'u + \mathrm{B}'w$. We have given the general methods; the number of transforma- ave succeeded in particular cases is very large. the equation is of the first order, but of a higher

$$+ \mathrm{P}_{n-1}\,y'^{\,n-1} + \ldots + \mathrm{P}_1\,y' + \mathrm{P}_0 = 0.$$

l mode of proceeding, occasionally convenient actice, is to find the n values of y', say $y' =$ $=\phi_2\,(x, y)$, &c. If these can be separately inte- , say $\psi_1\,(x, y, c) = 0$, $\psi_2\,(x, y, c) = 0$, &c., then primitive of the equation is

$$, y, c) \times \psi_2\,(x, y, c) \times \ldots\ldots = 0.$$

in the last, P_n, P_{n-1}, &c. are all homogeneous functions of x and y of the same degree, proceed as follows Reduce the equation to the form

$$y'^{\,n} + \mathrm{A}_1\,y'^{\,n-1} + \ldots + \mathrm{A}_n = 0.$$

in which A_1, &c. are of the form $\phi\,(y:x)$. Let $y = tx$ and find, in terms of t, the several values of y' or $t + xt'$, from the equation. Now $t + xt' = \phi t$, is an equation in which the variables can be separated. Solve each equation, and proceed as in the last.

25. The only equation of differences of the first order which can be generally treated, at present, is the form $\Delta u_x - \mathrm{P}_x\,u_x = \mathrm{Q}_x$, where P_x and Q_x are functions of x, or its corresponding form $u_{x+1} - \mathrm{P}_x\,u_x = \mathrm{Q}_x$. Supposing x to be an integer, which is what is usually required, let $\Sigma\,u_x$ denote $u_m + u_{m+1} + \ldots + u_{x-1}$, where m is an arbitrary integer chosen to start from. Accordingly $\Delta\Sigma u_x = u_x$. The solution of $u_{x+1} - \mathrm{P}_x\,u_x = \mathrm{Q}_x$ is

$$u_x = \mathrm{P}_m\,\mathrm{P}_{m+1}\ldots\ldots\mathrm{P}_{x-1}\left\{\mathrm{C} + \Sigma\frac{\mathrm{Q}_x}{\mathrm{P}_m\ldots\ldots\mathrm{P}_x}\right\}$$

26. Equations of differences in their most general form have solutions which appear to resemble the singular solutions of differential equations: but there are important points in which the resemblance fails. ('Differential Calculus,' *Library of Useful Knowledge*, p. 738.)

27. Let $y^{(n)}$ stand for the nth differential coefficient of y. The following expression

$$\mathrm{P}_n\,y^{(n)} + \mathrm{P}_{n-1}\,y^{(n-1)} + \ldots\ldots + \mathrm{P}_0\,y$$

is absolutely integrable, independently of all relation between y and x, if

$$\mathrm{P}_0 - \mathrm{P}_1' + \mathrm{P}_2'' - \mathrm{P}_3''' + \ldots\ldots \quad = 0,$$

in which accents refer to complete differentiation with respect to x. And the integral is

$$\mathrm{P}_n\,y^{(n-1)} + (\mathrm{P}_{n-1} - \mathrm{P}_n')\,y^{(n-2)}$$

$$+ (\mathrm{P}_{n-2} - \mathrm{P}'_{n-1} + \mathrm{P}''_n)\,y^{(n-3)} + \ldots\ldots$$

One remarkable case is this;—each term $\mathrm{P}_m\,y^{(m)}$ is absolutely integrable when P_m is a rational and integral function of x of a degree lower than the mth. Thus y^{iv}, xy^{iv}, x^2y^{iv}, x^3y^{iv}, are all integrable functions.

28. The equation $y^{(n)} = \phi x$ is not only completely integrable, but it may easily have all its intermediate differential equations found. For instance, suppose $y^{\mathrm{v}} = \phi x$. Multiply this successively by $1, x, x^2, x^3, x^4$, and, by the last section, we have five integrable equations, leading to the five differential equations of the fourth order which belong to $y^{\mathrm{v}} = \phi x$. Treat the first result in the same manner with $1, x, x^2, x^3$, the second with $1, x, x^2$, the third with $1, x$, and the fourth with 1, and we have the 10 equations of the third order. Proceed in the same way with the results, taking care never to let any multiplication enter which raises the coefficient as high as the order of differentiation which it accompanies, and then will appear successively 10 equations of the second order, 5 of the first, and finally the original primitive.

29. The following theorems will sometimes be of use. Let P_n stand for $\int x^n\phi x dx$. Then the nth integral of ϕx, or $\int dx)^n\phi x$, is the following series divided by $1.2.3\ldots(n-1)$

$$x^{n-1}\,\mathrm{P}_0 - (n-1)x^{n-2}\,\mathrm{P}_1 + (n-1)\frac{n-2}{2}x^{n-3}\,\mathrm{P}_2 - \ldots$$

$$\text{and } (m+1)\int x^m\mathrm{P}_n dx = x^{m+1}\mathrm{P}_n - \mathrm{P}_{m+n+1}$$

If the integrations in the last section be made by this last rule as they arise, the results will be given in terms of P_0, P_1, &c., and there will be no difficulty about the constants, which in the ordinary mode may appear to enter in too great numbers.

30. There are very few cases of equations of higher orders than the first which can be integrated in general terms. The equation $y'' = \phi y$ gives

$$y'^2 = c + 2\int\phi y dy$$

which is integrable. Again, $y'' + \mathrm{Q}y'^2 = \mathrm{R}$, Q and R being functions of y, gives

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must not be discouraged by finding that he does not succeed hich require detached artifices in the same manner as the entary work before him. The art of solving equations is made f constructing equations which can be solved is behind the re few or no mathematical works with many examples to the he proverb may not be applied, that 'those who hide know

$$x = \int \frac{W\,dy}{\sqrt{(2\int RW^2 dy)}} \text{ where log. } W = \int Q\,dy$$

and, by a change of the independent variable, $y''+Py'+Qy'^3=0$ gives, if P and Q be functions of x

$$y = \int \frac{W\,dx}{\sqrt{(2\int QW^2 dx)}} \text{ where log. } W = -\int P\,dx$$

31. The term *linear* equation is generally applied to one of the forms

$$y^{(n)}+P_1 y^{(n-1)}+\ldots+P_n y=0$$

in which P_1 &c. are functions of x only. If a solution be found which has not n distinct arbitrary constants, it is not the most complete solution, but is called a *particular** solution. It is a most important property of the linear equation that if n distinct particular solutions can be found, say $y=Y_1$, $y=Y_2$, &c. then the complete solution is

$$y = C_1 Y_1 + C_2 Y_2 + \ldots . + C_n Y_n$$

where C_1, C_2, &c. are any arbitrary constants.

32. The most remarkable case is that in which the coefficients are constants, as in $y^{(n)} + a_1 y^{(n-1)} + \ldots + a_n y = 0$. If the equation $k^n + a_1 k^{n-1} + \ldots + a_n = 0$ have n unequal roots, a, β, γ, &c., the general solution is

$$y = A\varepsilon^{ax} + B\varepsilon^{\beta x} + C\varepsilon^{\gamma x} \ldots\ldots\ldots$$

but if there should be, say m roots equal to a, the term which must belong to a in the solution is of the form

$$(A_0 + A_1 x + \ldots + A_{m-1} x^{m-1})\,\varepsilon^{ax}$$

A pair of imaginary roots, $\mu \pm \nu\sqrt{-1}$, contributes to the solution the term

$$\varepsilon^{\mu x}\,(K \cos \nu x + L \sin \nu x)$$

Letters introduced without specific mention mean arbitrary constants.

33. The most remarkable particular case of the preceding is

$$y'' + a^2 y = 0 \qquad \begin{aligned} y &= K \cos ax + L \sin ax \\ &= B \cos (ax + A) \end{aligned}$$

No one differential equation is of so much importance as this.

34. When the equation is linear in all but an independent term, as

$$y^{(n)}+P_1 y^{(n-1)}+ \ldots . + P_n y = X$$

X being a function of x, its solution can be deduced from that of the linear form, in which $X = 0$, by a method the importance of which will justify some account of it in a separate article. [VARIATION OF PARAMETERS, P. C. S.] We give the following result of it: $y''+a^2y = X$ gives

$$a\,y = \sin ax \int X \cos ax\,dx - \cos ax \int X \sin ax\,dx$$
$$+ K \cos ax + L \sin ax$$

35. The completed linear form (take the second order for an instance), $P_0 y'' + P_1 y' + P_2 y = X$ can be integrated (§ 27) one step if both sides be multiplied by the factor M, which satisfies the purely linear equation

$$MP_2 - (MP_1)' + (MP_0)'' = 0$$

This is another differential equation of the same order, but the difficulty is much reduced by it. The general solution of the last is not wanted; any particular solution will do. That is, if a particular solution of every linear equation could be found, the general solution of every completed linear equation could be deduced. And it will generally happen that when one particular solution can be found, to make an integrating factor, enough of them can be found to give the complete solution of the subsidiary equation.

36. The form $\phi\,(y, y', y'') = 0$, in which x is wanting, may be reduced to an equation of the first order, by making $y' = z$, when it becomes $\phi\,(y, z, zdz : dy)$. If z or y' be thence found in terms of y, the variables can be immediately separated: if y be found in terms of z, we eliminate z between $y = \psi z$ as found and $x = \int (\psi' z dz : z)$.

37. As an *à priori* mode of constructing linear equations and their solutions, note the following: If $\phi\,(x, y, y', \ldots . y^{(n)})$ have for its solution $y = \psi\,(x, a, b, c, \ldots)$ a, b, c, &c. being arbitrary constants, and if P_0, P_1, P_2, &c., be the differential coefficients of ϕ (with respect to y, y', y'', &c., considered as independent variables) with ψ substituted in the
y: then the solution of the linear equation

$$P_0 u + P_1 u' + P_2 u'' + \ldots . P_n u^{(n)} =$$

is

$$u = A\psi_a{}' + B\psi\,' + C\psi_c{}' + \ldots\ldots$$

A, B, &c., being new arbitrary constants.

38. If to an equation of the nth order, all the
of the $(n-1)$th order can be found, each with
constant, there is no occasion for any further inte
if $y'\,y'', \ldots . y^{(n-1)}$ be eliminated between the n
result will be the complete primitive.

39. The purely linear equation, or inde
which is homogeneous with respect to y, y', y'',
lowered one order by assuming log. $y = \int z dx$, or y
have used the former as more convenient to pri
be done with $P_0 y'' + P_1 y' + P_2 y = 0$, it gives

$$P_0 z' + P_0 z^2 + P_1 z + P_2 = 0.$$

40. In this way the solution of $y'' = \phi x \,.\, y$
with that of $z' + z^2 = \phi x$. When $\phi x = ax^m$,
Riccati's equation, and it can be integrated in fini
terms whenever $m = -4k : (2k \pm 1)$, k bein
integer.

41. If only a particular solution of $y'' + Py' +$
be found, then the general solution of $y'' + Py' +$
can be found from it. Let $y = Y$ be the partic
of the first, and let log. $W = \int P dx$: the general
second is

$$y = -Y \int \frac{\int RYW dx}{Y^2 W}\, dx.$$

42. If $\phi\,(x, y, y', y'') = 0$ would become
with respect to x and y, by considering y, y'
the dimensions n, $n-1$, $n-2$, assume $y = x^n u$,
$y'' = x^{n-2} w$, which reduces the equation
$\psi\,(u, v, w) = 0$. Then deduce

$$(w - \overline{n-1}\; v)\; du = (v - nu)\; dv.$$

and substitute for w its value in terms of u and
equation of the first order can then be integrated
$\chi\,(u, v) = 0$, we have to complete the proc
grating $\chi\left(yx^{-n}, y'x^{-(n-1)}\right) = 0$

43. To destroy the second term of $y'' + Py$
$= 0$, proceed as follows. Let $\xi = \int \varepsilon^{-\int P dx} dx$,
terms of ξ. Then we have

$$\frac{d^2y}{d\xi^2} + (Qy+R)\,\frac{dx^2}{d\xi^2} = 0$$

44. Any number of simultaneous equations
only one independent variable can be reduced
between two variables. For instance, let the
equations between x, y, z, t, and differential coe
y, z, with respect to t. Now, looking upon x, x'
&c. (excluding z, z', &c.), as so many independe
differentiate the four equations with respect to t.
then introduced *two* new differential coefficients
and *three* new equations: or the number of equatio
upon the number of quantities. Repeat the proc
same thing happens again, and so on. Consequ
must arrive at which the number of equations
more than the number of quantities. All the qu
then be eliminated, and there results one equation
z', &c., and t. The same thing may be done
y. The process will also reduce the number of
as many as there are independent variables, wh
number may be. The order of the result is the
orders of the original equations.

45. In the simple case of $Ay' + Bz' + C = 0$,
$= 0$, when A, P, &c., are functions of x, y, z,
dx, &c., we may proceed by eliminating y' and
$z' = M$, a function of x, y, z. Hence $z'' = M'_x +$
$M'_z\, z'$ from which we may eliminate y and y' by
equations, and thus produce an equation of the
to determine z in terms of x. And the same for
of x.

46. Let t be the independent variable, and let

$$x' = A_1 x + B_1 y + C_1 \quad , \; y' = A_2 x + B_2 y +$$

A_1 &c. being functions of t only. Determine

---

* The word particular is here opposed to general. Note this, because some writers have used *particular solution* to signify what is now generally called *singular solution*.

$$\theta'=A_2\theta^2+(A_1-B_2)\,\theta-B_1$$
$$z'=(A_1+A_2\theta)\,z+C_1+C_2\theta$$

erally be a function of double value; let θ_1 and θ_2 be
ues, and z_1 and z_2 the corresponding two values of
y, determine x and y from

$$x+\theta_1 y=z_1$$
$$x+\theta_2 y=z_2.$$

en the forms are

$$=A_1x+B_1y+C_1 \quad , \quad y''=A_2x+B_2y+C_2$$

ng constants (a case which is often useful) deter-
wo values of θ from

$$B_1+B_2\theta=(A_1+A_2\theta)\,\theta$$

o values of z from

$$z''=(A_1+A_2\theta)\,z+C_1+C_2\,\theta$$

and y from $x+\theta_1 y=z_1 \quad , \quad x+\theta_2 y=z_2$
, when the simultaneous equations are linear, with
efficients, proceed as follows. Say there are four
x, y, z, t; and three equations. Assume $x=\epsilon^{at}$,
$=c\epsilon^{at}$, and substitute: the result will be, after divi-
, three equations of the form $\phi\,(a, b, c)=0$, in
d c only enter in the first degree. Hence the
can be found by an equation whose degree is the
orders of the original equations, with one value of
each value of a. Let the values be $a_1, a_2, b_1, b_2, c_1,$
n the complete solution is

$$x=C_1\epsilon^{a_1t}+C_2\epsilon^{a_2t}+\dots$$
$$y=C_1b_1\epsilon^{a_1t}+C_2b_2\epsilon^{a_2t}+\dots$$
$$z=C_1c_1\epsilon^{a_1t}+C_2c_2\epsilon^{a_2t}+\dots$$

ng arbitrary constants.
enever the solution of a differential equation de-
that of an ordinary equation, and supposing the
all different, the form of the solution is

$$x=C_1\phi\,(a_1t)+C_2\phi\,(a_2t)+\dots$$

n, though still a solution, ceases to be the complete
en there are any sets of equal roots. If there be
al to a, and if $\phi' x$, $\phi'' x$, &c., be the successive
coefficients of ϕx, this set of roots contributes to
f x the terms

$$+K_1\,\phi'(at)\,.\,t+\dots\dots+K_{m-1}\,\phi^{(m-1)}(at)\,.\,t^{m-1}$$

particular case has been seen in § 32.
now look at one equation with three variables, two
re therefore independent. Let $Xdx+Ydy+Zdz$
e equation. This may have arisen direct from
$=c$, without alteration or loss of factors, &c.: and
e the case when $X'_y=Y'_x$, $Y'_z=Z'_y$, $Z'_x=X'_z$,
only. To return to the primitive, integrate
(§ 10) as if z were constant, and let the result be
tegral of $Xdx+Ydy+Zdz$ is then

$$P+\int(Z-P'_z)\,dz$$

when the criteria are satisfied, the integral (omitting
ommas to save room) of

$$(xyz)\,dx+\chi\,(xyz)\,dy+\psi\,(xyz)\,dz \quad \text{is}$$
$$(xyz)\,dx+\int_b^y\chi\,(ayz)\,dy+\int_c^z\phi\,(abz)\,dz$$

of which y and z are treated as constants, and z in

he criteria be not satisfied, a factor M may pos-
, such that MX dx + MY dy + MZ dz shall be
. But this cannot happen unless the following
e satisfied:

$$-Y'_x)+X\,(Y'_z-Z'_y)+Y\,(Z'_x-X'_z)=0$$

ctor, when this is satisfied, must satisfy any two of
equations.

$$M\,(X'_y-Y'_x)+XM'_y-YM'_x=0$$
$$M\,(Y'_z-Z'_y)+YM'_z-ZM'_y=0$$
$$M\,(Z'_x-X'_z)+ZM'_x-XM'_z=0$$

criterion be not satisfied, then there is no equa-
soever between x, y, z, which always produces
$dy+Zdz=0$.
equation $Xdx+Ydy+Zdz=0$, when pro-
$\phi\,(x, y, z)=c$, is the equation of a family of
e individuals of which are defined by the different
. That is to say, any point of one of these surfaces being taken, and any other point infinitely near to it, the equation is satisfied by x, dx, &c., as derived from these points. But when the criterion is not satisfied, then $Xdx+Ydy+Zdz$ still belongs to any surface in the following limited sense. On any surface, and through any point of it, a curve may be drawn such that the equation Xdx + &c. is satisfied if the two contiguous points first named be taken *on that curve.*

53. When there are three variables and two equations, with two constants, as in $\phi\,(x, y, z, a, b)=0$, $\psi\,(x, y, z, a, b,)=0$; the most ready theoretical mode of imagining the differential equations formed is the reduction to the form $a=\Phi\,(x, y, z)$, $b=\Psi\,(x, y, z)$, and differentiation. Two equations of the form $Pdx+Qdy+Rdz=0$ are thus produced; from which, by combination, may be derived an infinite number of pairs of the same kind, answering to the infinite variety of pairs which can be produced from the primitive equations. This corresponds with the obvious geometrical fact that one curve may be the intersection of an infinite number of different pairs of surfaces.

54. A partial differential equation, such as $\phi\,(x, y, z, z'_x, z'_y)=0$, belongs to an infinite number of surfaces distinguished by the forms of the arbitrary function which enters into the solution. The most general method of proceeding is as follows, which supposes that a particular solution is found having at least *two* new arbitrary constants. Let $f(x, y, z, a, b)=0$ be such a solution, and call it a *primary* solution. Make $b=Fa$, where Fa is any function of a, at pleasure. Then the *general* solution is

$$f(x, y, z, a, Fa)=0,$$

in which a is a function of x, y, z, determined from

$$f'_a(x, y, z, a, Fa)=0.$$

The arbitrary character of Fa introduces an arbitrary function.

The geometrical meaning of this is as follows:—the primary solution, a and b being independent, is the equation of an infinite number of families of surfaces: when b is made $=Fa$, the equation is restricted to one of these families; and each case of the general solution, answering to one form of Fa, is the equation of the surface which touches every individual of the family throughout the extent of some curve. Every surface which comes under the general solution is then tangent to a whole family of primary solutions. But it must not be forgotten that every primary solution is also a case of the general solution, so that there is no primary solution but what is also tangent to a whole family of other primary solutions.

55. There is generally a surface which touches all the surfaces of the general solution, and is a singular solution of the partial differential equation, not contained in the general solution. It is found by substituting in $f(z, y, z, a, b)=0$, values of a and b derived from

$$f'_a(x, y, z, a, b)=0, \qquad f'_b(x, y, z, a, b)=0.$$

We shall illustrate this subject in VARIATION OF PARAMETERS, P. C. S.

56. Let $Xu'_x+Yu'_y=U$, where X, &c. may be functions of x, y, and u. The integration entirely depends upon that of the following system of ordinary differential equations:—

$$\frac{dx}{X}=\frac{dy}{Y}=\frac{du}{U}$$

if these can be integrated, and the results reduced to the form $a=\alpha\,(x, y, u)$, $b=\beta\,(x, y, u)$, α and β being functional symbols, then the complete integral of the given equation is $\beta=f\alpha$, or

$$F\{\alpha(x, y, u),\ \beta\,(x, y, u)\}=0$$

f and F being any functions whatever.

This may be extended to any number of variables. Thus if

$$Xu'_x+Yu'_y+Tu'_t=U,$$

let the solution of

$$\frac{dx}{X}=\frac{dy}{Y}=\frac{dt}{T}=\frac{du}{U}$$

be obtained in the form $a=P$, $b=Q$, $c=R$, where a, b, c, are the constants introduced by integration, and P, Q, R, are functions of x, y, z, independent of those new constants. The complete solution of the partial differential equation is $F(P, Q, R)=0$, F being any function whatever.

57. The same mode holds when there are several equations with two more variables than equations, if the multipliers of differential coefficients be the same in all. Thus the system $Xu'_x+Yu'_y=U$, $Xv'_x+Yv'_y=V$, $Xw'_x+Yw'_y=W$, can integrated if the system

$$\frac{dx}{X}=\frac{dy}{Y}=\frac{du}{U}=\frac{dv}{V}=\frac{dw}{W}$$

can be integrated in the form $a=P$, $b=Q$, $c=R$, $e=S$, described as before. The complete solution is the system

$$F_1(P, Q, R, S)=0,\ F_2(P, Q, R, S)=0,\ F_3(P, Q, R, S)=0$$

where F_1, &c. are symbols of any functions whatever.

58. Nearly all that can be done in this part of the subject depends upon cases of three variables and their connection with surfaces. The following notation is in universal use. Having z, a function of x and y, let z'_x and z'_y be denoted by p and q, and the second differential coefficients z''_{xx}, z''_{xy}, z''_{yy}, by r, s, and t.

59. Let $z=px+qy+f(p, q)$ be the equation. A primary solution is $z=ax+by+f(a, b)$. The general solution, deduced as in § 54, gives the equation of all developable surfaces, if f be arbitrary. The form $q=\phi p$, ϕ being a given function, has $z=ax+\phi a.y+b$ for a primary solution, and belongs to a particular class of developable surfaces. Both these equations, and all developable surfaces, satisfy the equation $rt-s^2=0$.

60. For the method of dealing generally with the equation of the second degree, $Rr+Ss+Tt=V$, see 'Differential Calculus,' Library of Useful Knowledge, p. 719. It would hardly yield a short account for a work of reference.

61. Let $r=a^2t$. Of this very important equation the complete solution is

$$z=\phi(y+ar)+\psi(y-ax),$$

ϕ and ψ being any functions.

62. Let $z=\phi\,(p, q)$. Solve the common differential equation $y=\phi\,(ay', y)$, giving, say $y=\psi\,(x, b)$. Then $z=\psi\,(y+ax, b)$ is a primary solution of the given equation.

63. Let $\phi\,(p, x)=\psi\,(q, y)$. Let $\phi\,(p, x)=a$, $\psi\,(q, x)=a$, give $p=\Phi\,(x, a)$ $q=\Psi\,(x, a)$. Then eliminate a from

$$z=\int\left\{\Phi(x,a)\,.\,dx+\Psi(y,a)\,.\,dy\right\}+\chi a$$

$$0=\frac{d}{da}\int\left\{\Phi(x,a).dx+\Psi(y,a).dy\right\}+\chi'a$$

χa being any function whatever of a.

64. Linear equations of differences with constant coefficients, such as

$$u_{x+3}+au_{x+2}+bu_{x+1}+cu_x=0$$

may be solved in a manner corresponding to linear differential equations by assuming $u_x=m^x$ and obtaining its particular solutions by means of $m^3+am^2+bm+c=0$. But what we have to say on these will be referred to another article.

We have not touched on the application of the calculus of operations, nor on that of definite integrals, subjects which are now of very great importance. On these points see OPERATION, P. C. S., INTEGRALS, DEFINITE, P. C. S. See also FUNCTION, ARBITRARY, P. C. S.

It must be noticed that a great portion of the most important part of the subject of differential equations cannot enter in any work on pure mathematics. The physical subjects of gravitation, heat, electricity, &c., depend so much on certain differential equations that, by common consent, the details are referred to works on these subjects, and do not appear separately.

EQUISETUM (from 'Equus,' a horse, and 'Seta,' a hair or bristle, from the character of the leaves), a genus of plants, the type and only genus of the order Equisetaceæ. The species are leafless branched plants, with a striated fistular stem, articulations sheathed at the base; the sporules are surrounded by elastic clavate filaments, and inclosed in thecæ arising from the peltate scales of terminal cones; the vernation is straight, and the cuticle abounds in silex.

E. hyemale, Dutch Rush, has a simple stem, very rough, with from 14-20 slender furrows; the sheaths close, whitish, but the top and bottom black; the teeth slender, black, deciduous. This plant is a native of England, Scotland, and Ireland, as well as the continent of Europe. It is almost unknown in the middle and southern English counties, and is only sparingly distributed anywhere. It was recommended as a medicine by the ancients, and the earlier herbalists quoted them as authorities for its virtues; but it is not now used in medicine. It appears, however, to possess tannin, and to act as an astringent. It is supposed to be injurious to cows, and is said to cause their teeth to drop out, but horses eat it with impunity. This plant, more than any other species, is used for the purposes of polishing. Lightfoot says, that in Northumberland the milk-maids scour their pails with it
used for the purposes of polishing wood, bone, ivory
metals, particularly brass, and is brought into
from Holland, where it grows abundantly in larg
and is sold in the shops of London under the na
Rush. Mr. Newman thinks, however, that the
brought from Holland is a different species from
E. hyemale. The stems of this plant contain lar
of silex, and in the ash left after burning it form
97 per cent. Under the microscope, the silex ap
form of minute crystals, forming a longitudinal s
vations on the stem. The quantity of silex is s
the vegetable matter may be burned away and y
retain its form.

E. Mackaii has a simple, or very slightly bra
rough stem, with 8-12 furrows, the sheath close
wholly black: teeth slender, persistent. This
in the north of Ireland, and is named by Mr. N
its discoverer Mr. I. T. Mackay, author of the
bernica.' Sir Wm. Hooker has referred this
E. elongatum of Willdenow; but Babington
Newman's species.

E. variegatum has a simple stem, or very slight
very rough, with 5-9 furrows, the sheaths sligh
upwards, green below, black above; the teeth
tipped with a deciduous bristle. The stem is
high. It is found on sands near the sea, or in
mountain valleys in Great Britain.

E. palustre has the stem with 6-8 de
branched throughout; the sheaths loose, pale.
wedge-shaped teeth tipped with brown, and m
the edges. This plant is very generally dis
Great Britain. This species is liable to alte
ters, and three tolerably permanent varieties
described.

E. fluviatile, water horse-tail, has a sterile
smooth, with about thirty striæ and branches; bra
doubly angular, simple; the fertile stem simple,
ous crowded, large, deeply-toothed sheaths.
E. Telmateia of Ehrhart and Newman's 'Histo
Ferns.' Its present name was erroneously given
which has been adopted by Hooker and Babi
one of the most beautiful of the species, attainin
three, four, and even five feet. It is abundant
bourhood of London, especially near Hamps
It is a native also of the more southern countrie
Although it grows in water, as its name would
grows in dry situations; and the name *fluvi*
applicable to the original plant of Linnæus, th
of English botanists. Horses sometimes eat th
from a passage in Haller, he seems to have su
was eaten by the Romans; he says, 'Hoc fuer
quod a plebe Romanâ in cibum recipitur.' (
iii. 1.)

E. limosum has a smooth stem, with 14-16 s
the teeth of the sheaths short, rigid, and acute:
erect, simple, whorled, often abortive. This is
the *E. fluviatile* of Linnæus, but we have give
Smith, as that which has been followed by
Babington in their Floras of Great Britain.
seen very commonly in ponds and ditches, and
running streams, the roots and a portion of the
immersed in water. It is a common plant throug
Linnæus says that in Sweden it is used as food
order that cows may give more milk, and also
deer feed on it. He advises that it should be
summer as fodder for the winter. Cattle in this
sometimes eat it. Mr. Knapp also records the
common water-rat is very fond of it. It is pro
some states of the system of animals it acts med
neither this nor any other of the species of Equi
be fitted for the constant food of animals.

E. sylvaticum, wood horse-tail, has the steril
stems, with about 12 furrows and numerous whor
compound spreading or deflexed branches; the
with 6-10 membranous rather blunt teeth. It is
shady places and moist woods throughout Great

E. Drummondii has the sterile stem, with a
striæ, very scabrous, with prominent points,
above; the branches simple, with four sin
the fertile stem simple, with numerous crow
toothed sheaths. This plant has not been long
native of Great Britain, but Mr. Newman thinks it

mmon plant, and says it is identical with the *E. umbrosum* Villdenow.

E. *arvense*, corn-field horse-tail, has the sterile stem, with furrows, slightly scabrous; the branches simple, rough, four simple angles, the fertile stem simple, with few lax nt sheaths. This is the most common of all the species, frequently a source of serious injury to the farmer and ner. It is subject to variation according to the locality ich it grows. It is easily distinguished from *E. um-* e, for which it might be mistaken by its drooping and and branches.

wman, *History of British Ferns and Allied Plants;* gton, *Manual of British Botany;* Loudon, *Encyclo- of Plants.*)

ASTIANISM. [Erastus, P. C. S.]

ASTUS, THOMAS, a physician, and the author of s medical works, but better known for the use made of ne in ecclesiastical discussions, than in connexion with n profession. He was born at Baden in Switzerland, 7th of September, 1524. He obtained the rudiments education in his native place, and studied in the neigh- g city of Basel in 1540. There, in 1544, he was at- by the plague, and narrowly escaped death. He is have either on that or some other occasion lost the use right hand, but to have acquired the power of writing y with the left. At Basel he seems to have studied ty, philosophy, and literature. He afterwards went to na, where he studied medicine, and appears to have ly acquired a high scientific reputation. After having ned nine years in Italy, he went to Germany, and was e Elector Palatine Frederic III. made Professor of c in the University of Heidelberg. The scientific cter which he acquired in his own profession appears to been that of one who did not take dogmas or theories for ed, but acted on induction from his own experience. He ppointed physician to the prince, and held rank as coun- of state in the Palatinate. He soon afterwards entered polemical controversy. In 1564 a conference was held e monastery of Maulbronn on the question of the real nce, or rather on the question whether the reference to body and blood was not entirely figurative, at which us maintained the view that it is figurative. He soon wards became involved in his celebrated controversy as to mmunication. A sort of fanaticism in favour of the use clesiastical censures and punishments had been introduced levianus, a refugee from Trier or Treves, and by several ives from the cruelties of the Duke of Alva in the Low tries, and had spread among the Protestants of the Pala- e. Erastus termed it 'febris excommunicatoria,' and ght it an unwise policy for the Protestants, surrounded heir enemies, to be zealous in cutting off members from own communion. He examined the principles and al authority of ecclesiastical censures, and carried on a oversy in which he was violently opposed by Dathenus, more mildly by his friend Beza. This controversy would probably died as a local dispute, had it not been revived stelvetro, who had married the widow of Erastus, pub- g from his papers the theses called 'Explicatio Quaes- gravissimæ de Excommunicatione,' which bears to have written in 1568, and was thus published in 1589. The l principle adopted by Erastus is, that ecclesiastical es and other inflictions are not the proper method of ing crimes, but that the administration of the penal law, the law for compelling performance of civil obligations, rest with the temporal magistrate. He held that the r ground on which a person could be prohibited from ing the ordinances of a church—such as the sacrament mmunion of the Lord's Supper—was not vice or immo- , but a difference in theological opinion with the church which he sought the privilege. The church was to de- who were its members, and thereby entitled to partake privileges, but was not entitled to take upon itself the hment of offences by withholding these privileges, or by ting any other punishments, on the ground of moral mis- ct.

is pretty clear that whatever other view may be enter- d by particular churches as a matter of opinion, ecclesias- censures and punishments, unless as in England they are virtual by mere forms of civil procedure, are a dead r to all temporal efficacy in every country in Europe e justice is well administered. Few authors so often red to have been so little read. The original theses ery rare. An English translation was published in 1669, and was re-edited by the Rev. Robert Lee in 1845. By some inscrutable exaggeration, it had become the popular view of the doctrines of Erastus, that his leading principle was to maintain the authority of the civil magistrate over the conscience, and to subject all ecclesiastical bodies to his direction and control, both in their doctrine and their discipline. In the late discussions in the church of Scotland, of which the result was the secession of a large body of the clergy and people because it was found that the church could not make a law to nullify the operation of lay patronage, those who maintained within the church the principle that it had no such power were called Erastians as a term of reproach. As in all cases where such words as Socinian, Arian, Antinomian, &c., are used in polemical debates, the party rejected with disdain the name thus applied to it. But it is singular that in the course of this dispute no one seems to have thought of explaining that the controversy in which Erastus was engaged was about a totally different matter, and that only a few general and very vague remarks in his writings have given occasion for the supposition that he must have held the principle that all ecclesiastical authorities are subordinate to the civil. It is probable that any of the disputants who may have made themselves acquainted with his opinions found them so distinct from their reputed character, that they were disinclined to undermine the arena of conflict by letting the secret come to light. Thus were pamphlets written in refutation of Erastianism without any reference to the writings of Erastus, and perhaps with a knowledge that they did not contain the opinions attacked. Erastus died at Basel on 31st December, 1583, leaving a considerable sum for the promotion of education in Basel and Heidelberg. He had published at the former town in 1565 a work 'De Discrimine Logicæ et Scientiæ Demonstrativæ.' He wrote several works on medical science, the greater part of which are in the British Museum.

(Ersch und Gruber, *Allgemeine Encyclopadie;* Adamus, *Vitae Germanorum Medicorum*, 107—109.)

ERBIUM. [Chemistry, P. C. S.]

EREMECAUSIS, is the act of gradual combination of the combustible elements of a body with the oxygen of the air. It is in fact a process identical with combustion, but not attended in most cases with any sensible development of heat and light. This process is constantly going on in combustible bodies exposed to the action of atmospheric air, and one of the first changes which take place during the decomposition of animal and vegetable substances, is the union of one or more of their combustible elements with oxygen. The change of the elements of wood into the substance called humus, the formation of acetic acid from alcohol exposed to the air, the production of nitrates of the alkalis, and other processes of a like kind, have been shown by Liebig to be dependent on the process of eremecausis. The changes in colour, consistence, and other properties which vegetable juices, saw-dust, leaves of trees, blood, &c., undergo when exposed to the atmosphere are owing to the same cause. These changes however do not take place when water is excluded, nor when the substances are at a temperature of 32°, all bodies requiring a certain amount of temperature to enable them to combine with oxygen. It has also been observed that, although nitrogen itself does not directly combine with oxygen, substances possessing nitrogen are exposed in the highest degree to this process.

Eremecausis differs from fermentation and putrefaction from the fact that it cannot take place without the access of atmospheric air, through which means the oxygen is supplied to the decaying body. Although the terms putrefaction and fermentation are generally applied, the first to decomposing substances emitting odorous gases, and the second to decompositions emitting inodorous gases, it will be found that these processes are essentially the same, putrefaction going on in bodies containing nitrogen, fermentation in substances without this gas. [Fermentation, P. C.] Although it is not uncommon for fermentation and putrefaction to be regarded as processes which may go on in bodies independent of external agents, Liebig has pointed out the fact that in all cases eremecausis must take place previous to any decomposition in organic substances. 'The juices of the fruit,' he observes, 'or other parts of a plant which very readily undergo decomposition, retain their properties unchanged as long as they are protected from immediate contact with the air, that is, as long as the cells or organs in which they are contained resist the influence of the air. It is not until after the juices have been exposed to the air, and have absorbed a certain quantity of oxygen, that the substances dissolved in them begin to [illegible] composed.' Gay Lussac found that the juice of grapes which were expressed under a receiver filled with mercury, so that air was completely excluded, did not ferment; but if the smallest possible quantity of air was admitted, fermentation immediately began. Again he found that if the juice was exposed to a boiling temperature, and then bottled and corked tight, that it would not ferment till again exposed to the influence of atmospheric air.

In the same way animal food of every kind is kept from putrefaction by being heated to, and secured in vessels at, the temperature of boiling water. Food thus prepared has been kept for fifteen years, and when the vessels were opened in which it was contained, it has been found as fresh as when first secured. The oxygen in these processes acts by exciting a change in the composition of the azotised matters dissolved in the juices, the composition of these substances undergo a change in consequence of their contact with oxygen, and new combinations are produced. A remarkable and important fact with regard to this process is, that when this condition of intestine motion is once excited, the presence of oxygen is no longer necessary. The smallest particle of a body containing nitrogen in the act of decomposition, communicates the same state to the particles in contact with it, and the whole mass thus becomes influenced by the first oxygenated particle. If the atmospheric air be excluded after this process has commenced, the fermentation or putrefaction proceeds uninterruptedly to its completion. It is thus that a single particle of animal or vegetable matter in a state of eremecausis will cause, by contact with other substances, fermentation and putrefaction, and upon this fact depends the necessity of adding yeast or some ferment to saccharine solutions before fermentation will properly take place.

In carbonaceous substances their decomposition is usually attended with the formation and giving off of carbonic acid, but in substances containing nitrogen other secondary compounds are formed, more especially nitric acid, and the decomposition of these substances is sometimes called nitrification. Liebig has shown that the nitric acid in these cases is not formed by the direct union of oxygen and nitrogen, but that the first consequence of the slow decomposition of nitrogenized bodies is the formation of ammonia, and that it is the nitrogen of the ammonia, whilst its hydrogen is uniting with oxygen to form water, that unites with the oxygen of the air to form nitric acid. Ammonia is more readily oxidized than any other compound of nitrogen, and this is to be attributed to the presence of hydrogen, the oxidation of which yields water, which is necessary to the formation of nitric acid. Nitric acid may be formed in this way in substances containing no nitrogen, as the atmosphere is capable of supplying ammonia; and this will explain the presence of nitrates on the surface of the earth, on old walls, &c., as well as in decomposed animal matters.

(Liebig, *Chemistry of Agriculture*; Turner, *Elements of Chemistry*, 7th edition.)

ERIGERON, a genus of plants belonging to the natural order Compositæ, the sub-order Corymbiferæ, the tribe Asteroideæ, the sub-tribe Asterineæ, the division Astereæ the sub-division Erigereæ. It has many-flowered radiant heads; the flowers of the ray ligulate, with pistils only and in many rows, those of the disk tubular; mostly with both stamens and pistils, the receptacle naked and foveolate; the involucre imbricated, the pappus pilose in one or many rows, the fruit compressed.

E. Philadelphicum has the stem slightly furrowed, downy, with spreading hairs; the leaves of the root cuneate-obovate, sometimes deeply sinuate, the upper becoming gradually entire, oblong-lanceolate, and amplexicaul; the florets of the ray 1-200 pale purple, slightly bifid. This plant is a native of North America, and is used as a medicine in the United States. It possesses stimulant properties, and is given as an emmenagogue; it also acts on the kidneys, and is considered a valuable diuretic. It has a powerful fœtid smell.

E. acris has the stem corymbose, the branches alternate, bearing single heads; the leaves linear, lanceolate, entire, spreading: the lower leaves narrowed below; the ray erect, scarcely longer than the disk; the inner female florets filiform, numerous. It has a stem 6-18 inches high; the flowers yellow in the disk and pale blue in the ray. The ashes of this plant contain about five per cent. of potassa, and it is sometimes burned for procuring the alkali. It has a strong scent, and like many other species of the family is said to keep away fleas. With species of Conyza [Conyza, P. C. S.] and *Pulicaria*, it has the name of flea-bane. It is a native of Europe, and is a common plant in Great Britain.
densis and *E. alpinus* are also found in England
land: the first is a rare plant, and is found on wa
the second is a native of Highland mountains. T
are numerous, and some of them are ornamental pl

(Babington, *Manual*; Burnett, *Outlines of*
Lindley, *Flora Medica*.)

ERIODENDRON. [Wool-Tree, P. C.]

ERO'DIUM (from ἐρωδιός, a heron), a genu
belonging to the natural order Geraniaceæ. It h
5 petals, 10 monadelphous stamens, 5 fertile and 5
glands at their base; the fruit beaked, separati
1-seeded capsules, each with a long ultimate
twisted awn, bearded internally. The species a
undershrubs, having variously-formed leaves,
stipules, and many-flowered peduncles. The spe
genus, like those of Geranium and Pelargonium, a
upwards of fifty having been described.

E. cicutarium, Hemlock-leaved Heron's Bill,
cumbent hairy stem, the peduncles many-flowered,
of the petals ciliated, the perfect stamens dilated,
below, glabrous, the beak hairy, the leaves pinnate,
sessile, pinnatifid, cut. The flowers are purplis
It is a native throughout the whole of Europe, a
in the north of Africa. It is abundant on sandy
waste ground in Great Britain. There are se
marked varieties, some of which may be really spe
E. c. pimpinellæfolium.

E. moschatum, Musky Heron's Bill, has a
hairy stem, many-flowered peduncles, the claws o
not ciliated, the perfect stamens toothed at the ba
the beak downy, the leaves pinnate, the leaflets se
ovate, unequally cut. It is found in waste plac
Britain, but is an unfrequent plant. It is a large
the preceding, and emits, when handled, a str
odour. This plant is very generally diffused, a
found all over Europe, at the Cape of Good H
Peru.

E. maritimum, Marine Heron's Bill, has a prost
hairy stem, the peduncles 1-2-flowered, the pet
nute, the leaves simple, ovate, cordate, stalked,
crenate. This is a rare plant, but a native of Gr
in sandy and gravelly places near the sea.

Most of the remaining species are natives of Eu
are found in the north of Africa, two or three i
the same number in America; but the mass of the
European. The perennial species are ornament
thrive well in any kind of garden soil. They ma
gated by dividing the roots or by seed. Many of
species are handsome plants, and may be pro
seed, which ripens in this country, and only req
sown in the open border to spring in any kind of

(Babington, *Manual of British Botany*; G.
dener's Dictionary.)

ERO'PHILA. [Draba, P. C. S.]

ERSKINE, EBENEZER, founder of a consi
of seceders from the established church in Scot
the Secession church, was born on 22nd June,
studied in the university of Edinburgh, for some
as tutor and chaplain in the family of the Earl of
became a licentiate in divinity in 1702. In 1
chosen minister of Portmoak in the shire of Ki
became a very popular preacher, and though his
in a retired district people flocked from distant pa
land to attend on his ministration. After havi
various offers of ministerial appointments in other
was prevailed on to accept of a charge in the town
in 1731, after he had served for twenty-eight ye
moak. Mr. Erskine's first difference with his co
the church of Scotland was in his support of the p
'the marrow of modern divinity,' a subject of gr
tion during the early part of the eighteenth cen
was one of several clergymen who, in connectio
subject, were 'rebuked and admonished' by th
Assembly. The secession of the body headed
Erskine was occasioned by the operation of the Act
Anne's reign restoring lay patronage in the churc
land, and, though not in all respects technically th
was virtually on the same ground as the late secessio
Free Church.' The presbytery of Kinross, led by
brother Ralph, had refused to induct a presentee
an objecting congregration by the law of patro
1732, the General Assembly enjoined the pres

e the presentee. At the same time they passed an act sembly regulating inductions, which, as it tended to e the law of patronage, was offensive to Mr. Erskine, e preached against it. After some discussion, the al Assembly decided that he should be 'rebuked and ished,' confirming a decision of the inferior ecclesias- ourts. Against this decision Mr. Erskine entered a st,' in which he was joined by several of his brethren. as afterwards suspended from his functions. The bly subsequently endeavoured to smooth the way for toration, but he declined to take advantage of it, and l his friends, including his brother Ralph, formally d in 1736. [SECEDERS, P. C.] When the Secession vided into the two sects of Burgers and Anti-burgers, rskine and his brother were of the party of the former. d on 22nd June, 1756.

wn, *Historical Account of the Secession;* Chambers, *f Eminent Scotsmen.*)

SKINE, RALPH, author of Gospel Sonnets, and other us works, was born on the 18th of March, 1685, and died 6th of November, 1752. He became clergyman of rish of Dunfermline in 1711, and his celebrity chiefly n his alliance with his brother Ebenezer in the found- the sect of the seceders in Scotland. [ERSKINE, EBEN-

SKINE, JOHN, a writer on law, was born in the year His father was the honourable John Erskine, son of Cardross, and he was thus the cousin-german of Lord ellor Erskine. Erskine's life was that of a recluse t, and was marked by few incidents. In 1719 he be- member of the faculty of advocates, but he does not to have had much practice. In 1737, he was ap- d professor of Scots Law in the university of Edinburgh. 54, he published 'Principles of the Law of Scotland' in lume 8vo., a work remarkable for its lucid arrange- and for the terseness and clearness of its exposition of ding principles of the law. It was designed to be a ook for his students, but became a leading law authority. d through several editions, the last of which was edited 27, by Professor More, the present occupant of Erskine's He retired from his professorship in 1760, and died own estate of Cardross in 1765. He had employed ars of retirement in expanding the matter of his 'Prin- ' into a larger work, which he left behind him nearly d, and which was published in 1773, in two volumes with the title 'An Institute of the Law of Scotland.' work has been repeatedly republished with notes, bring- own the law to the dates of the respective editions. It great oracle of Scottish law, an authority almost without l, and as firmly established as 'Coke upon Littleton' is gland. It is of little value in respect of its constitutional which the author seems not to have been capable of ving otherwise than in mere detail. Owing to the late se of commerce and manufactures in Scotland, the por- relating to these subjects is meagre and antiquated. l things however relating to the rights of persons arising their relation to each other, and in the peculiar rules of udal system in Scotland, the work continues to be of value, and to be as useful to the practical lawyer as in its dity of research and clearness of detail it is an object of ation to the theoretical student.

SKINE, JOHN, an ecclesiastical leader, son of the ling, was born on the 2nd of June, 1721. He was d as a preacher in 1743, and in 1744 obtained the of the parish of Kirkintilloch, near Glasgow. In he received the degree of D.D. from the university of ow. In 1767 he was appointed one of the ministers of llegiate church of the Greyfriars in Edinburgh. He or his colleague Dr. Robertson the historian, who was of the moderate party in church politics, or that body had the least affection for the predominant characteris- the Presbyterian creed and polity, while Erskine was ader of the Evangelical Popular, or as it was sometimes l Orthodox party—the same which lately seceded from church of Scotland, and formed the 'Free Church.' ne was an active popular preacher and leader, and the of the books and pamphlets written by him would fill a derable space. He died on the 19th of January, 1803. memory is still revered by his own party.

ccount of the Life and Writings of John Erskine, by enry Moncrief Wellwood.)

RU'CA, a genus of plants belonging to the natural order iferæ, and to the tribe Brassiceæ. It has an erect calyx, obovate petals, distinct, not toothed stamens; an oval, oblong, 2-celled, 2-valved, silique; smooth concave valves, with an ensiform seedless beak, scarcely shorter than the valves; the seeds globose. The species are annual branched herbs, with erect terminal racemes of flowers, which are white and yellow, and remarkable for their beautiful reticulation of brown veins.

E. sativa, Garden Rocket, has lyrate pinnatifid leaves, with toothed acute lobes, a hairy stem, the pedicels shorter than the deciduous calyx. It is a native of cultivated fields and waysides in the north of Africa, in Spain, Portugal, France, Italy, Switzerland, and Greece. It is very subject to varieties, and many have been described by various botanists. Although mostly hairy, sometimes its stem is smooth. In height it varies from three inches to two feet, and the flowers are very variable in the depth and arrangement of their colours. When full grown it has an acrid and unpleasant taste, and a strong, peculiar, almost fetid smell; but when young and tender it is frequently eaten as a salad, especially on the Continent. It is the *Roquette cultivée* and *La Rocket des Jardins* of the French, *Raukette* of the Germans, and *Ruccola* of the Italians. The whole plant has been used in medicine as a sialagogue. The ripened seeds are a good substitute for the seeds of the mustard, but not so pungent. When cultivated as a salad, the seeds should be sown in a warm border early in February, and again in March and April for successive crops. The plants should be thinned, after they have produced the first rough leaves, to about three or four inches apart, and they should be kept clear of weeds. If a supply is required throughout the year, the seeds may be sown every month. The plants sown in February should be allowed to produce seed, which ripen in August, and may be used for all the sowings. *E. hispida* and *E. vesicaria* are European plants, and when cultivated as ornament need only to be sown in the open border and treated as other hardy annuals.

(Lindley, *Flora Medica;* Don, *Gardener's Dictionary.*)

ERUCASTRUM, a genus of plants belonging to the natural order Cruciferæ, and to the tribe Brassiceæ. It has a square pod, the valves convex, with one straight nerve, the seeds oval or oblong in a single row. This genus has been formed by Schimper and Spenner for some of the species of the old genus Sinapis. *E. incanum*, the *Sinapis incanus* of Linnæus, has been found in sandy places in Jersey and Alderney, and has consequently a place in the British Flora. It has adpressed pods, which are turgid, with a short 1-seeded beak. The stem reaches from 1-3 feet high. This plant is also a native of the South of Europe, especially Spain; and is the *Cakile Hispanica* of L'Heritier; the *Hirschfieldia adpressa* of Moench. Koch, in the 'Synopsis Floræ Germanicæ et Helveticæ,' gives three species of this genus as natives of Switzerland and the upper district of the Rhine.

(Babington. *Manual of British Botany;* Don, *Gardener's Dictionary.*)

ERVUM [VICIEÆ, P. C.]

ERY'NGIUM, a genus of plants belonging to the natural order Umbelliferæ, and the tribe Saniculeæ. It has a calyx of five leafy teeth, the petals erect, oblong, with a long inflexed point, the fruit obovate, covered with chaffy scales without ridges or vittæ. The species are usually perennial spiny herbs, with the flowers congregated into oblong or roundish dense heads.

E. maritimum, Sea Holly, has the radical leaves roundish, plaited, spurious stalked, the upper leaves embracing the stem, palmately lobed, the leaves of the involucre 3-lobed, spurious, longer than the heads, the scales of the receptacle 3-lobed. The stem is more than a foot in height, and is branched and leafy. It is a native of Europe on the sands of the sea-shore, and is found on the European and African shores of the Mediterranean Sea. It is abundant on the eastern shores of England, and is found in Scotland and Ireland. The plant is called in England Sea Eryngo, Sea Hulver, and Sea Holme. According to Linnæus the flowering shoots are very good when boiled and eaten like asparagus. The leaves are sweetish, with a warm aromatic flavour. The root also is sweet to the taste, and has an aromatic smell. It has been used in medicine as a tonic, and Boerhaave regarded it as a valuable aperient and diuretic. The root is also supposed to possess aphrodisiac virtues. It is candied and sold in the shops in London as a sweetmeat. There is still an establishment at Colchester, in Essex, where the roots are candied, in which town this preparation was first made, more than two centuries since, by Robert Buxton, an apothecary. It is not now much used by medical men, but at one time it had a reputation in many diseases.

E. campestre has the radical leaves two or three times pinnatifid, spinous, stalked, the stem leaves embracing the stem, bipinnatifid, the leaves of the involucre lanceolate, spinous, longer than the heads, the scales of the receptacle undivided. It is a more bushy and slender plant than the last. It grows on waste ground, and in dry sandy fields, and is a very common plant in the south of Europe. It is found in England and Scotland, but is a rare plant. There is a plant found on the banks of the Tyne called *E. campestre*, but Mr. Babington thinks this may be a different species. The plant which Ray describes as growing on the shore, called Friar's Goose, below Melling, in Yorkshire, Mr. Babington thinks requires further examination, before determining the claim of this plant to be considered a true native of Great Britain.

E. fœtidum has the radical leaves lanceolate, bluntish, narrowed at the base, spinous; the floral leaves palmate, sessile, the leaves of the involucre lanceolate, much longer than the heads, the palea among the flowers entire. It is a native of Jamaica, Cayenne, Demerara, Florida, and Brazil, in fields and woods. The negroes and poorer whites in Jamaica regard this plant as a valuable remedy in hysterical fits; hence it is called in the West Indies fitweed. It is administered in the form of a decoction or infusion of the whole plant.

E. aquaticum, Rattle-snake Weed, has the leaves broadly linear, with parallel nerves; the lower leaves ensiform, the floral leaves lanceolate, toothed; the leaves of the involucre shorter than the heads of flowers; the stems dichotomous. It is a native of North America, from Pennsylvania to Virginia. It is also found in the Society Islands, California and Buenos Ayres. It inhabits marshes, inundated pastures, and the banks of rivers. This plant is employed in North America as an application to the bite of the rattle-snake, hence its common name.

Nearly one hundred species of this genus have been described. They are found in greatest numbers in America, but many are inhabitants of Asia, Africa, and Europe. They are most of them handsome and ornamental plants, and worthy of cultivation. They will grow freely in any common garden soil, but the lighter or more sandy the soil the better they will grow. Some of the species require the greenhouse or frame, and they should be grown in pots. They may be propagated by dividing the roots or by sowing the seed.

(Don, *Gardener's Dictionary*; Babington, *Manual of British Botany*; Lindley, *Flora Medica*.)

ERY'SIMUM (from ἐρύω, to draw), a genus of plants belonging to the natural order Cruciferæ, and to the tribe Sisymbreæ. It has a tetragonal pod, the valves prominently keeled with one longitudinal nerve, the stigma obtuse, entire or slightly emarginate, the seeds in a single row, the funiculus filiform. The species are annual, biennial, or perennial herbs, with variable leaves, and elongated, terminal, many-flowered racemes.

E. Alliaria of Linnæus, Smith, Schkuhr, and others, is generally now admitted as the type of a new genus, *Alliaria* of Adanson. It differs from Erysimum in not having its valves keeled with a single nerve, but having 3 longitudinal nerves, and in the seeds being striated, and the funiculus flattened and winged. *E. Alliaria* is the *A. officinalis* of Andrzeijowski, who is followed by De Candolle in his 'Prodromus,' and Babington in his 'Manual.' Koch however follows Scopoli and places it in *Sisymbrium* as *S. alliaria;* from which genus it differs only in its flattened winged funiculus. It has heart-shaped leaves, the lower ones being reniform and coarse, repando-crenate; the pods are erect and patent, much longer than their stalks, and the seeds are oblong and cylindrical. The stem is erect, one to two feet high, and slightly branched. The flowers are white. It is a native all over Europe, under hedges and in ditches. It has a strong smell, and a taste not unlike garlic, for which it is frequently used as a substitute, whence it has obtained its Latin name Alliaria, from Allium, garlic. It is very generally used by the poor people of the countries in which it grows as a condiment, with bread and butter, salted meats, or in salads. In England it is known by the name of Sauce Alone, and Jack by the Hedge. In German it has several names as das Knoblauchkraut, der Knoblauchhederich, Lauchel, Waldknoblauch, Ramfen, Ramschelwurzel, Gernsel, Salsekraut, Saskraut. In French it has the names l'Alliare, l'Herbe aux Aillets, &c. Although not often found on the tables of the middle or upper classes, Mr. Neill says, that 'when gathered as it approaches the flowering state, boiled separately and then eaten to boiled mutton, it certainly forms a most desirable pot-herb, and to any kind of salted meat an excellent green.'
Linnæus says that sheep and cows and poultry eat it,
horses and goats refuse it. When eaten by cows it give
agreeable flavour to the milk. Poultry also which eat
a bad flavour when cooked. The seeds when powde
duce sneezing, and have been employed as a ster
The leaves were formerly used as a diaphoretic, and
tice of them was recommended as an antiseptic in ga
and cancerous ulcerations.

A second species of Alliaria has been described as
chycarpa, a native of Iberia.

E. cheiranthoides, Worm-seed, Treacle Mustard,
long-lanceolate leaves, slightly toothed, with stella
parted hairs, all narrowed into a slight footstalk, the
longer than the calyx, two or three times shorter
pods, the pods patent, ascending, the seeds small,
It is a native of Europe, also of North America. It is
uncommonly in Great Britain; it inhabits cultivated
waste places, and osier holts. It varies greatly in
cording to situation. The flowers are very numerous,
and yellow. It has obtained its name worm-seed fr
fact of its seeds being sometimes used as a remedy for
tinal worms. It was also formerly employed as an ing
in the famous Venice treacle, and hence the whole
been called treacle-mustard. Babington marks th
the other species of Erysimum as plants that have be
sibly introduced into Great Britain, though now looking
like true natives.

E. virgatum has linear lanceolate leaves, entire, with
two or three parted hairs, the lower ones narrowed
footstalk, the upper leaves mostly sessile, the pedicels
as the calyx, many times shorter than the pod, the p
the seeds large. It is found in Great Britain plentiful
Bath. It is also a native of the Alps and of Holland.

E. orientale has elliptical heart-shaped obtuse leave
ing the stem, the radical leaves obovate, all smooth,
undivided, entire. This is the *Coringia orientalis*
drzeijowski, and *E. alpinum* of Baumgartner, and
alpina of Linnæus. It is a native of the south of
and is found in England and Ireland, in fields and
the sea. It has white or cream-coloured flowers. Th
about fifty species of Erysimum, most of them
Europe, and a few in the temperate districts of Asia,
and America. Some of them are ornamental and
cultivation. The perennial herbaceous species
adapted for the flower-border, and may be grown
common garden soil. The smaller species may be
for ornamenting rock-work, and many of them may b
in pots with other alpine plants. The perennial spe
be propagated by cuttings, by dividing the roots,
seeds. The annual and biennial species may be sow
open ground.

(Babington, *Manual of British Botany*; Don, *Ga*
Dictionary; Sowerby, *English Botany*.)

ERYSIPHE. [Gasteromycetes, P. C. S.]

ESCROW. [Deed, P. C.]

ESCUTCHEON. [Heraldry, P. C.]

ESOX, a genus established by Linnæus for the
of the pike and some allied fishes. It is now subdivid
the resulting genera, with the flying-fishes (*Exocœtu*
stitute the family Esocidæ. The genus *Esox*, as at
received, has for its type the *Esox Lucius* of Linn
common pike. The generic character is founded on th
and armature of the organs of mastication. The jaws,
tine bones, and vomer are furnished with teeth of
sizes. The head is oblong, obtuse, depressed, and la
proportion to the body. The dorsal fin is placed far ba
over the anal. Both these fins are entire, which is th
case in the genus *Belone*, of which the gar-fish is th
(*Esox Belone* of Linnæus); but in that fish the head an
are greatly produced, the latter being linear and p
Scomberesox (the Saury) is a third genus of this family,
a head resembling that of *Belone;* but the anal and dors
are divided posteriorly into finlets resembling those of
kerel. *Hemiramphus* is a curious genus of sea-pikes, in
the upper jaw is extremely short, while the lower one rese
that of the gar-fish. *Exocœtus*, the flying-fish, was
guished from *Esox* by Linnæus. It has the head com
tively short, the dorsal and anal fins placed much
forward, and the pectoral fins so large as to serve the p
of wings, or rather of parachutes, which sustain the fish
air for some time after it has sprung out of the water.

The true or fresh-water pikes are well known fish
teemed for food, and remarkable for their voracious

tive habits. They are the longest lived and largest of -water fishes, and many wonderful stories are narrated of . Gesner gives an account of one, the skeleton of which preserved at Mannheim, which weighed 350 pounds, and probably between 200 and 300 years old. Pennant ms us of one ninety years old; and pikes from fifty to ty pounds weight have been taken in Scotland and Ire- . It grows with great rapidity, attaining a length of eight to ten inches in its first year. The Mannheim pike aid to have been nineteen feet in length, and in our own ry they have been taken nine feet long. The pike eats erything eatable which comes in its way. Being strong, and courageous, it masters all other fishes in its locality. l also attack birds and small quadrupeds, if within reach, as been known to quarrel with the otter for its prey, and ault man himself. Pikes are found in Europe, Asia, and America. In the United States several species are non.

e habits of the sea-pikes, the gar-fish, and the saury *aberesox*) are not so well known. They are gregarious, swim near the surface of the water, leaping out of it great agility, and playing round bodies which float on the e of the sea. The peculiar formation of the heads of fishes renders the nature of the food a subject of curi- among naturalists; but the question is not yet settled. the southern coasts of England and Ireland they are non. The bones of the Belone are green: the flesh is and white, and has much the flavour of that of the erel.

SSEX, JAMES, the first professional man in the last ry who made Gothic architecture his study and practice, the son of a carpenter in good business at Cambridge, e he was born in 1723. Educated in the school of 's College, the unrivalled Chapel became the object of dmiration, and finally impressed him with the powers and ties of a style which was then neither valued nor under- , but scornfully rejected as monkish and barbarous. pt his own eyes and his own diligence, he had nothing to or direct him in the study of it—nothing to give him the slightest insight into its principles. Greatly there- is it to his credit that his own judgment and perseverance led him to attain the knowledge of it, and to do in it he did, instead of being led astray like Batty Langley, had about that time just published his 'Gothic Architec- improved by Rules and Proportions.' In 1757 he was loyed by Bentham to make drawings for his work on Ely edral, and from him he acquired much information rela- to the history of Gothic architecture and its leading es; and of that cathedral itself he altered the choir in 0, and conducted extensive repairs in other parts for many afterwards. He was also engaged in repairing Lincoln ster, where he erected a stone altar-piece of his own de- ing. Besides various alterations at several of the colleges ambridge, he executed some repairs at King's College el, and designed the stone screens about the altar there. ng his other works was a monumental cross at Ampthill, emory of Catherine of Aragon; and improvements in the nt mansion at Maddingley, Cambridgeshire, the seat of ohn Hinde Cotton. He also published designs for new ings at King's, Benet (Corpus Christi), and Emmanuel eges, and for a new Public Library at Cambridge. His tation as an antiquary was considerable, and he was ac- ated with most of those who were noted for their attach- to similar studies—Gray the poet, Horace Walpole, gh, Tyson, Cole of Melton, and others. Besides being a ber of the Society of Antiquaries, he contributed some rs to their Archæologia, viz. 'Remarks on the antiquity ifferent modes of brick and stone buildings in England,' 4; 'Observations on Lincoln Cathedral,' vol. 4; 'On the in and antiquity of Round Churches,' vol. 6. His name ld no doubt have been more generally known had he lived effect his intention of publishing Plans and Sections of g's College Chapel. He died at Cambridge of a paralytic ke, September 14th, 1784, only four months after his her, who reached the age of eighty-four.

SSINGTON, PORT, is the first and to this day the existing European settlement on the northern coast of tralia. The idea of establishing a colony in this part of world appears to have been suggested by the unprece- ted rapidity with which the colony of Singapore rose in year following its establishment, which took place in 9. [SINGAPORE, P. C., vol. xxii. p. 41.] As the trading ulation of the western portion of the Indian Archipelago had resorted to Singapore for the disposal of their produce and the purchase of European and Indian commodities, it was thought that a similar establishment at the eastern extremity of that archipelago would attract the merchants of the eastern portion of it. But the first attempt was not successful. The coast of this part of Australia having been surveyed a few years before, the new colony was founded in 1824, in Apsley Strait, which separates the islands of Melville and Bathurst, and was called Fort Dundas. In 1827 a small establishment was erected at Raffles, on the peninsula of Coburg, and called Fort Wellington. But both settlements were abandoned in 1828, because none of the Malay traders resorted to them. The climate was found to be rather unfavourable to Europeans, and the soil of an indifferent quality; besides which, Apsley Strait is difficult of access, and encumbered with shoals. Major Campbell, who was the last commandant of Fort Dundas, had an opportunity of examining the country in the neighbourhood of these settlements, and he recommended the establishment of a colony at Port Essington, which was made in 1838.

Port Essington is a deep inlet, situated on the northern side of Coburg peninsula, which projects west-north-west from the mainland of Australia, between Mount Norris Bay on the north-east and Van Diemen's Gulf on the south, and extends in that direction nearly sixty miles. The greatest breadth of the peninsula is fifteen miles, and its narrowest part, where it is joined to the main by a neck of land of five miles in length, is two and a half.

Port Essington lies between 11° 6′ and 11° 25′ S. lat., and between 132° 5′ and 132° 18′ E. long. The inlet at its entrance, between Point Smith on the east, and Vashon Head on the west, is seven miles wide, and extends south by east between seventeen and eighteen miles. Its average breadth is five miles. The depth of water varies between five and twelve fathoms, and at the southern end it forms three spacious harbours, each of which extends inwards three miles, with a width of about two; the depth of water is five fathoms, with a bottom of stiff mud and sand. These harbours are sheltered from every wind, and afford excellent and secure anchorage for vessels. Indeed the whole port is a secure place of anchorage for vessels of any size, and forms altogether one of the finest harbours in the world. There is no harbour yet known (Port Jackson excepted) to be compared with it in the whole extent of Australia, and it may be entered with safety both by night and day. Being within the range of the regular monsoon, it is accessible to the Malay and Bugis trading proas and to the junks from China.

The shores of this inlet present a pleasing variety of little bays and sandy beaches, alternating with bold cliffs and steep clay banks. The interior of the peninsula is a continuous forest of trees of dark-green foliage, occasionally relieved by small round hills, rising a hundred feet above the general elevation of the land, which rises in gentle undulations from one hundred to two hundred feet above the level of the sea, but in many places only from thirty to sixty feet. The soil is in general indifferent, but in many places it is good, principally on the low flats and hollows, and near tracts which are swampy in wet weather. The best land is found on the east of Port Essington. The vegetation is luxuriant. The forest land is clear of underwood; the grounds and hollows produce good grass, even in the middle of the dry season, and it is supposed that most, if not all, the tropical productions could be brought to considerable perfection on Coburg peninsula. The trees, though not of great dimensions, are of sufficient size for house-building and agricultural purposes. Most of the trees introduced by the settlers thrive very well, especially the orange, lemon, shaddock, cocoa-nut, and tamarind trees. Pine-apples are excellent; bananas, pumpkins, and sweet potatoes, succeed well; also the sugar-cane, turmeric, arrowroot, capsicums, and culinary vegetables. But the vegetation suffers much during the dry season, and requires to be irrigated. There are some indigenous roots which the natives use as food.

The woods of the peninsula contain buffaloes, wild cattle, ponies, and pigs. They appear to be the offspring of the stock left at Port Raffles when the settlement was broken up, with the exception of the buffaloes, which are met with in considerable numbers, and probably were brought there long before. There are also kangaroos, bandicoots, iguanas, pigeons, quails, curlews, wild geese, ducks, and swamp pheasants, and a great variety of perroquets, cockatoos, hawks, herons, cranes, and gulls. The inlet is also well stocked with fish, especially mullet, cavallos, bream, gar-fish, flounders, whitings, a kind of pike, white mackerel, sting-ray, a fish resembling a herring, fourteen or fifteen inches long, ship-jacks, old wives, and several others. Of shell-fish there are the common oyster and the large mother-of-pearl shell oyster, green turtle, spotted crabs, oysters, cockles, craw-fish, cowries, and various other small shell-fish. The most important of the sea productions is the trepang or *biche de mer*, which is very abundant along the northern coast of Australia, from Endeavour Strait (142° 30′ E. long.) to Dundas Strait (131° 30′), which divides Coburg peninsula from Melville Island, and attracts a large fleet of Malay proas during the months of December, January, February, March and April, their fishing-ground extending from the Gulf of Carpenteria to Dundas Strait. In November the Malays begin their fishing by going to the eastward through Bower Strait, which is west of the Gulf of Carpenteria, and then gradually return with the monsoon to the westward until April or May, when, having cured the trepang and completed their cargoes, they repair to the ports in the Indian Seas from whence they sailed. These Malays carry also on some commerce with the natives, from whom they obtain large quantities of tortoise-shell in exchange for iron, rice, and old clothes.

The north-west monsoon brings the rainy season. It is preceded by squalls and variable winds. The time of its commencement varies between three and four weeks. Sometimes it begins at the end of October, and at other times in November or the beginning of December. The rain during this monsoon falls in torrents, but seldom continues above two or three hours at a time. It generally falls from two to five o'clock in the afternoon or during the night. The general range of the thermometer is from 80° to 95° in the shade. The mean heat at midday is between 87° and 92°, and the extremes 70° and 96°. During this monsoon there is almost daily thunder in the afternoon and evenings. The termination of the north-west monsoon is indicated by squalls, and usually a tempest in the early part of April. The sun then returns to the northward, the wind settles in the north-east, the sky becomes clear, the rains cease, the atmosphere becomes drier, and the weather more temperate. In May the thermometer ranges between 75° and 95°, the midday heat being 89°. June, July, August, and September are the most pleasant season in the year. The mornings and evenings are agreeably cool, and exercise can be freely taken until ten in the morning, and may frequently, with impunity, be taken even in midday. Very few showers fall during these months, but there are heavy dews at night. In exposed places vegetation is completely burnt up. The thermometer during these months is between 69° and 75° at six o'clock in the morning, 84° at three in the afternoon, 77° at nine at night: the extremes are 68° and 90°. Notwithstanding the clearness of the sky during the dry season, the atmosphere contains considerable moisture, which is evident from the great difficulty of keeping steel articles from rust. The monsoons blow uniformly at forty miles from the coast. In the interval the winds often blow in the direction of the monsoons, but frequently they are changed into regular sea and land breezes. In Port Essington these breezes are frequently affected by the tides. After a calm they spring up and blow into the port with the flood, and again fall calm or blow out with the ebb.

Meteorological observations have been made regularly for four years, at six o'clock in the morning and at two o'clock in the afternoon. The following table contains an abstract of them :—

	Morning.	Afternoon.	Mean.
January . . .	80·3°	87·5°	83·9°
February . . .	80·0	88·0	87·0
March . . .	79·3	89·0	84·1
April . . .	79·1	89·8	84·4
May . . .	78·8	89·3	87·1
June . . .	73·2	84·6	78·9
July . . .	71·8	84·5	78·1
August . . .	71·5	85·4	78·4
September . .	75·0	88·0	81·5
October . . .	78·6	91·2	84·9
November . . .	83·6	91·9	87·7
December . . .	80·5	92·8	86·6

The average heat of the whole year is 83°, or about that of the equator. The difference of temperature between the observations in the morning and in the afternoon does not generally amount to more than 7 or 8 degrees in the rainy season, but during the dry weather it is commonly 12 degrees, and frequently even 20.

On the western shores of Port Essington the town of Victoria was founded in 1838. It stands upon a rising
elevated about fifty feet, in the highest parts, abo
water mark, and is built on a dry soil, which evide
duces to the healthiness for which it is remarkable.
it consisted of about ten wooden houses and twenty-
formed for the most part of reeds, surrounded by gar
contained a population of about sixty persons. The
have not yet settled there, which is attributed to the
imposed on the settlers by government; but, as th
lately been more accommodated to the views of the
it is to be hoped that the population will soon be in
settlers from Timor, Celebes, and other islands, wh
object of great importance for the prosperity of the
Europeans are unable to do the labour required fo
tion in this climate.

(Major Campbell, 'Geographical Memoir of Melv
and Port Essington, Northern Australia,' in *London*
phical Journal, vol. iv.; Earl, 'Account of a Visit t
in *London Geogr. Journ.*, vol. xi.; Owen Stanley, '
Cruise in the Eastern Archipelago,' in *London Geog*
vol. xii.; and *General Report of the Colonial Land*
gration Commissioners, printed by order of the
Commons, 1844.)

ESTRA'NGELO, or ESTRANGHELO, is the
the most antient of the three kinds of characters
writing the Aramaean or Syriac language. The al
called, of which there is a copy in the Prolegomen
ton's 'Polyglot,' p. 11, is distinguished by the sti
angular forms of the letters from that found in a
Syriac books, which is denominated fscitto (that is
or sertto (linear). A character nearly resembling th
ghelo is stated to be still commonly used in writi
Nestorians and some of the Melchitae. It is b
have been originally common to all the nations
speaking any Chaldaic dialect. The Syriac gramm
enumerate a third alphabet, which they designate
(meaning the duplicated), or the messttariono (t
but this is merely an alphabet of what we should
letters, used for ornamental purposes.

See *Grammatica Syriaca, sive Chaldaica, Georgii*
Amirae Edeniensis è Libano, 4to., Rom. 1596, cap.
copies of all the three alphabets are given.

ETESIAN WINDS. [Wind, P. C.]

ETON, a parish in Buckinghamshire, situated i
on the north bank of the Thames, one mile north of
and 23 miles west by south of London. Windsor
are in different counties and on opposite sides of the
but they form in appearance only one town. Th
houses is interrupted only by the river, over which
bridge of cast-iron, erected in 1823-4 from the desig
Hollis. The town of Eton principally consists of
street which is well paved and lighted. The pari
is a neat modern edifice from a design by Mr. H
engineer of the bridge. The living is a rectory, i
culiar jurisdiction and incumbency of the provost
There is a charity-school founded by a former Fre
at Eton College, who endowed it for the instruction
boys and thirty girls. The parish of Eton is small,
tains only 690 acres. Eton College is extra-paroc
1841 the population of Eton was 3526, and the n
inhabited houses was 533; there were 11 uninhabite
and only 3 building.

ETON COLLEGE was founded and endowed b
VI., as the 'College of the Blessed Marie of Eton
desore.' The foundation charter is dated at Wind
September, 1440, and is in good preservation. It
firmed by act of Parliament at Westminster, May 4
The Statutes of Eton College are printed in the P
tary Reports on the Education of the Lower Orde
The original foundation was a provost, ten priests, fo
six choristers, twenty-five poor grammar-scholars
master to teach them, and the like number of poor
now consists of a provost, seven fellows, two conduc
clerks, seventy King's scholars, ten lay clerks, ten c
and a number of inferior officers and servants. The
must be born in England, of parents lawfully marri
the foundation statute, they should be clothed in som
uniform, but this is not done, and their education sh
gratis, but a sum of 6*l*. or 7*l*. a year is now charged
instruction. Practically however the children of
who are really poor do not pay anything; but g
speaking, there is little difference in the relative sit
comparative opulence of the parents of the oppidans

are not on the foundation) and the collegers. The ation scholars are admissible from the age of eight teen, and unless elected at the age of seventeen, and on the roll for admission to King's College, Cam- e, another foundation of Henry VI., they are super- ated at eighteen. Those scholars who are elected may nue in college till nineteen; and even at eighteen they leave the college and continue as oppidans. The annual on to King's College takes place in July or August, after amination of the upper class by the provosts of Eton and 's College, Cambridge, the vice-provost of Eton, two s of King's College, called 'Posers,' and the head master ton. The successful candidates are not immediately ferred to Cambridge, but remain at school until a vacancy s on the foundation of King's College. On their removal ambridge the Eton scholars are received on the founda- and maintained out of its endowments, and after three they succeed to fellowships. The number who go to bridge averages four yearly. There are two scholarships erton College, Oxford, for foundation scholars who are lected for King's College, Cambridge: the scholars who sent to Merton College are called 'Postmasters.' There some other exhibitions, amongst which are several for annuated scholars. In 1829 the Duke of Newcastle ded and endowed three scholarships of the value of 50*l*. ; and in 1842 Prince Albert instituted an annual prize of for promoting the study of modern languages. The Eton tem is an antient ceremony which takes place triennially. bject is the collection of 'Salt-money,' which, after defray- expenses, is given to the senior scholar called the Captain he School, on his removal to King's College, Cambridge. scholars go in procession to Salthill, and 'salt-bearers,' ed by scouts, both arrayed in gay fancy dresses, levy con- tions from the visitors, which in some years exceed 1000*l*., e festival is not only attended by old Etonians, but by persons of rank and fashion who have children at the school, or are attracted by the gaiety and animation of the festival. ides the scholars on the foundation, Eton College is at- led by upwards of six hundred scholars called oppidans, y of whom are the sons of persons of rank and fortune, and d with the masters, from whom they receive instruction as endiary pupils. The school is divided into upper and lower, each is subdivided into three classes. There are a head er and lower master, ten assistant-masters in the upper ol and three in the lower school, and a mathematical er, and the whole sixteen are in holy orders. There are masters for the French, Italian, and German languages, other branches of education. The 'Journal of Education' ins an account of the course of instruction pursued at Eton, ome alterations have been made since that time.

the dissolution of the monasteries the revenues of Eton ge were estimated at 1100*l*. In 1506 the total income of ollege was 652*l*. and the disbursements amounted to 645*l*. income of the College from its endowments at present nts to about 7000*l*. a year, derived from reserved rents, rents, sale of woods, and also from manors, by fines and s. The average income of the fellows is about 550*l*., and erage of the provostship is that of a double fellowship and 400*l*. a year besides. The fellows have besides the of presenting themselves to one living. The college bout forty livings in its gift. The fines are divided into parts, two of which are received by the provost, and the fellows have each one part. Each fellow has in addi- 50*l*. a year, which is called a stipend. They have also ngs, and have generally offices in the college with a rate salary. The sum collected for teaching the seventy gers and some six hundred oppidans is divided between upper master in the upper school and the lower master in ower school.

he College buildings are a conspicuous and ornamental ct, especially if viewed from the terrace of Windsor le. They consist of two quadrangles, built partly of tone, but chiefly of brick, in a style somewhat resembling h front of St. James's Palace. In one quadrangle are ol and the chapel, with lodgings for the foundation , and in the other are the library, which contains a valuable collection, the provost's house, and the apart- f the fellows. The chapel, which is built of stone, is lly a handsome structure, though very plain in the . Its length is 175 feet, including an ante-chapel, s sixty-two feet long. In the centre of one quadrangle bronze statue of Henry VI., and in the chapel there is her statue of the same king by Bacon. The extensive playing-grounds on the north-west of the college are ornamented with an avenue of stately trees.

ETSHMIADZIN is an Armenian convent situated in that part of the Russian government of Georgia which was ceded by Persia in 1828. It is about three hours' distance from the town of Erivan on the west, and lies in the plain which separates the high summits of the Ala-Ghesh from the still more elevated masses of Mount Ararat. This plain is fertilized by a great number of canals, which are abundantly supplied with water from the river Kharsakh or Karpi-shai, which rises on the eastern declivities of Mount Ala-Ghesh, and running southward, falls into the Aras or Araxes. The convent is of great extent, and surrounded by a wall more than thirty feet high. The circuit of the wall is stated to exceed two versts, or nearly one mile and a half. This convent has for many centuries been the seat of the Armenian patriarch called Catholicos, and thus has become the centre of the Armenian literature. It contains a considerable library. Literature flourished among the Armenians immediately after their conversion to Christianity, which took place in the fourth century, and the ardour and zeal of the learned Armenians were then so great that almost all Greek authors of value, and some Latin writers, were translated into the Armenian language. The learned Europeans who visited the convent in the present century wished to see the library, but they could not obtain access to it: they were only informed that it contained 16,000 manuscripts. As soon however as Russia had been put in possession of the country, the Russian government repeatedly asked for a catalogue of the library, and at last obtained it. It was printed in St. Petersburg in the Russian language, and contains only 635 manuscripts, of which 462 are in the Armenian language, and the remainder in foreign languages. The catalogue is divided into eleven sections:—1. Manuscripts of the Bible and Commentaries referring to it, 83 in number; 2, Theology, 22 manuscripts; 3, Poetry, 8; 4, Church-books, 33; 5, History and Geography, 86; 6, Classics, 34; 7, Sermons, 53; 8, Fathers of the Church, &c., 105; 9, Books referring to the Church of Armenia, 4; 10, Dogmatical writings, 14; 11, Prayer-books, 22. Though this library does not contain the works of Diodorus Siculus, Polybius, and others, which it was hoped would be found in it, there is good reason for expecting that the historical works will throw a new light on the numerous political changes to which the nations of Western Asia have been subject since Christianity was established in Armenia.

(Ouseley's *Travels in various Countries in the East*; Ker Porter's *Travels in Georgia, Persia, Armenia, &c.*; Brosset, *Catalogue de la Bibliothèque d'Echchmiadzin*, Petersburg, 1840.)

EUGENIACRINITES, a genus of fossil Crinoidea. (Goldfuss.)

EU'GNATHUS, a genus of fossil Placoid fishes, from the lias, thirteen British species. (Agassiz.)

EULO'PHIA (from εὖ, and λόφος, a crest), a genus of plants belonging to the natural order Orchidaceæ. It has an open spreading perianth; the sepals and petals ascending nearly equal, either quite distinct or united with the more or less lengthened base of the column; the lip horned or shortly spurred, sessile, with the veins crested, bearded, or quite smooth, usually 3-lobed, sometimes undivided: the column half-terete, edged; the anther terminal, opercular, the pollen masses 2, waxy, 2-lobed, or hollowed out at the back, with a short linear caudicula, and a transverse gland. The species are terrestrial plants, with pseudo-bulbous rhizomata, long membranous plaited leaves, and radical many-flowered scapes. Most of the rhizomata and roots of the species of the family Orchidaceæ yield starch in a peculiar form. The roots of the species of Orchis are used in Europe, under the name of Salep, as an article of diet, and the same use is made of the rhizomata of a species of Eulophia in the East Indies. Although specimens of the plant were brought from Cashmere by Dr. Royle, they were not in a state of preservation to be identified.

(Lindley, *Flora Medica.*)

EUO'MPHALUS, a genus of fossil Gasteropoda, from the Palæozoic strata. (Sowerby.)

EUO'NYMUS (εὐώνυμος, literally 'having a good name,' and hence various derived senses), a genus of plants belonging to the natural order Celastraceæ. It has a flat 4-5-lobed calyx with a peltate disk at the base; 4-5 petals inserted in the margin of the disk; 4-5 stamens inserted in the disk; a single style; the capsule 3-5-celled, 3-5-angled, the dehiscence loculicidal; the seeds solitary, with a fleshy arillus, not truncate at the hilum. The species are shrubs with tetragonal or terete branches, and ovate usually opposite leaves, yielding a fetid odour when bruised, and considered poisonous.

E. Europæus, Spindle-tree, has the petals oblong, the flowers mostly 4-cleft, and tetrandrous, the branches tetragonal, smooth, and even, the leaves elliptic-lanceolate, minutely serrate, the capsule obtusely angular, not winged. It is a native of Europe in hedges and thickets, and is found abundantly in Great Britain. The flowers are small, of a greenish white colour, and give out a fetid odour. Its wood is tough and white, and is used for making skewers. It has from this got the name of Prick-wood; Gerard calls it Prick-timber. Its French name is *Fusain*, in allusion to its use in making spindles. It is called also in French *Bonnet de Prêtre* and *Bois à Lardoire*, the former in allusion to the capsules, which, when open, bear some resemblance to a priest's cap; the latter from the use made of the wood in making skewers and larding pins. It has, in common with the Cornus sanguinea, the names of Dogwood and Gatteridge Tree; the first name is in allusion to the use of the wood of these trees for making an infusion with which mangy dogs were washed. It is also known in English by the name of Louse-berry, a name which it has got from its berries being used when powdered as an application to the head for the destruction of lice. The wood of this tree is also used by musical instrument makers. When used for skewers, tooth-picks, &c. the branches are cut when the shrub is in blossom, as that is the period when the wood is toughest. Linnæus says that cows, goats, and sheep eat the leaves, but that horses refuse them. The berries are poisonous, and produce, when eaten, vomiting and purging. Whilst growing wild in hedges and coppices this plant does not attain any great size; but when planted and allowed to grow alone, it becomes a tree, and reaches a height of twenty or thirty feet. Although almost entirely neglected in the planting of pleasure-gardens, it forms a singularly beautiful object in the autumn, when its clusters of red berries are ripe. The seeds are covered with an arillus, which is of a beautiful orange colour.

E. verrucosus has the branches warted with proximate lenticular glands, the leaves ovate and slightly serrate, the flowers three on a peduncle, the petals ovate, the capsule bluntly 4-cornered. This is a deciduous shrub or low tree, a native of Austria, Hungary, and Carniola. This tree has a singular appearance, and is worthy of cultivation on that account amongst collections.

E. latifolius has smooth branches, broad ovate leaves, trichotomous many-flowered peduncles, oval obtuse petals, the lobes of the capsule acutely angular and wing-formed. It is a deciduous shrub or low tree, attaining a height of 10-20 feet, and is a native of the south of Europe. Its fruit is large and of a deep red colour: the decaying leaves are also reddish. This is the handsomest species of the genus. It has broad shining leaves, and its large red pendulous fruits, with their orange-coloured seeds, which are suspended in the air when the capsules open, contribute much to the beautiful appearance of this tree.

E. Americanus, American Spindle-tree, has smooth branches, the leaves almost sessile, elliptic-lanceolate serrated, the flowers one to three on a peduncle, the petal sub-orbiculate, the capsules warty. This is a sub-evergreen recumbent shrub, and is a native of North America from Canada to Florida. The capsules are of a deep crimson, the seeds white, and the arillus scarlet. They add much to the beauty of this plant, and have given rise in America to its common name, the *burning bush*. It is of easy culture in a moist soil. Several varieties have been described by botanists. *E. atropurpureus* is found in English gardens, and is a native of America. *E. Hamiltonianus* is a Nepaul species recently introduced. *E. nanus* is a dwarf species.

About thirty species have been described. All the hardy kinds are easily cultivated in any common soil in the open air. They may be propagated by seeds which ripen in this country. Cuttings planted in the autumn will readily take root.

(Loudon, *Encyclopædia of Trees and Shrubs*; Don, *Gardener's Dictionary*.)

EUPATO'RIUM, a genus of plants belonging to the natural order Compositæ, the tribe Eupatoriaceæ, the subtribe Eupatorieæ, and the division Adenostyleæ. It has 3-100 flowered heads, a flat naked receptacle, the scales of the involucre in 1 or 2 or more rows, equal or unequal, loosely or closely imbricated, the throat of the corolla hardly dilated,
the anthers inclosed, the arms of the style exsert
cal, obtuse; the pappus in one row, hairy, rough.

E. cannabinum, Hemp Agrimony, has the leav
deep, lanceolate, serrated segments, the middle
It is a native of Europe, and is mostly found on
streams. It is a common plant in the British
stem is about 3 feet high, and has a slightly aro
The whole plant is bitter, and was formerly
medicine as a tonic and febrifuge. An infusion
is said to be the common medicine of the turf-dig
land against the ulcerations and diseases of the
to which they are subject. The expressed juice,
in large quantities, produces both vomiting and p

E. perfoliatum, Thorough-wort, Thorough-
wort, or Bone-set, has subsessile, opposite, linea
acuminate leaves, decreasing gradually, in bread
stem, where they are widest, to the extremiti
wrinkled, pale underneath, and hairy, especiall
This plant is a native of North America in
boggy soils. It has erect, round, hairy stems, br
at the top with a cylindrical imbricated involuc
from 12 to 15 flowers, the florets of which are
parts of this plant are intensely bitter, and a dec
leaves has been recommended by American physici
able tonic and stimulant, and used as a substitute
bark in the cure of intermittent fever. In large
fusion or decoction of the whole plant is emetic,
aperient. It is used with advantage instead of
of chamomile flowers in working off emetics.

E. Ayapana has subsessile opposite, lanceo
nerved, acuminate, nearly entire, smooth lea
originally a native of South America, on the
of the river Amazons, from whence it has bee
into the East Indies. It has a stem, shrubby
branched and smooth, the heads are pedicellat
tain about 20 florets. An infusion of this pla
Brazil as a diuretic and diaphoretic. It has al
ployed as an antidote against the bites of venom
and insects. A quantity of the bruised leaves is
scarified wound, and the fresh juice is administer
to time to the patient. The reputation of this
bites of poisonous serpents, like that of many o
bably undeserved. Other species of Eupatorium
cinal properties: *E. aromaticum* and *E. odorat*
fragrant roots; *E. perfoliatum* and *E. rotundifoli*
employed in renal diseases and consumption. Th
of older botanists is now referred to the gen
[MIKANIA, P. C. S.]

(Burnett, *Outlines of Botany*; Lindley, *Flor*
Lewis, *History of Materia Medica*.)

EUPHRA'NOR, of the Isthmus of Corinth,
mian, as Pliny terms him, was one of the most
the antient Greek artists; he was the conte
Apelles and Praxiteles, and flourished during the
of the fourth century before Christ, from about
B.C. He was equally celebrated as painter and
and, says Pliny, was in all things excellent, and
equal to himself. Euphranor, continues Pliny,
to represent heroes with dignity, and first used
where symmetry probably means as much a gene
of design as correctness of proportions. One pe
his design was a large and muscular limb in pro
the body. It was this character of his figures
well as colour, that he alluded to, when he said,
to two pictures of Theseus, by Parrhasius and
that his own had fed upon beef, while that of Par
been fed upon roses; the picture of Euphranor
resembling more nearly the figure of a Greek ath
that of Parrhasius was more in accordance with
form of a divinity, as we find them expressed in th
of the Parthenon, and the Apollo Belvedere, re
and in many other Greek statues. [PARRHASIU
There are notices of many of Euphranor's works bot
ing and in sculpture. He painted in encaustic. T
three noble pictures by him at Ephesus—a group o
phers in consultation, clothed in the pallium, or
general sheathing his sword, probably a portrait;
feigned insanity of Ulysses; Ulysses was represent
plough, with a horse and an ox under the same
probably Palamedes with the infant Telemachus w
duced—an admirable subject for a picture. His
brated works, however, were a picture of the Tw
and a Battle of Mantinea, painted in the Ceramicus

painted, according to Plutarch, with a degree
it represented Gryllus, the son of Xenophon,
some Athenian horse, defeating the Boeotians
ndas, who is said to have been slain by Gryl-
Pliny, and Pausanias call it a cavalry fight;
c. 362.

re of the Twelve Gods, Eustathius relates the
lote:—Whilst the picture was in progress Eu-
ndering about Athens at a loss for a model
', when happening to pass the door of the
e heard repeated the celebrated lines of
i. 529),

> r, and gave the nod of assent with his dark eyebrows,
> osial locks of the king were shaken
> tal head.'

y exclaimed, I have found a model! and went
ed the head accordingly. However, according
ximus, he bestowed so much care upon the
ne, that he exhausted himself, and being un-
ne head of Jupiter above it, he is said to have
mpian Jupiter of Phidias. A similar criticism
ts, with perhaps as little truth, has been often
ling the celebrated picture of the 'Last Supper'
Da Vinci: Lionardo is said to have taken so
h the head of St. John that he was forced to
r Saviour unfinished, in despair of surpassing
Euphranor's most celebrated work in sculpture
of Paris, which was praised, says Pliny, for
same time the judge of the goddesses, the
, and even the slayer of Achilles. Pliny men-
al statues by Euphranor, which were at Rome.
s on symmetry and on colours.
. *Nat.* xxxiv. 8, 19; xxxv. ii. 40; Quintilian,
xii. 10, 3; Plutarch, *De Glor. Athen.* 2;
; Eustathius, *Ad Iliad.*, i. 529; Valerius Max-
.)

IA (from *εὐφρασία*, 'delight'), a genus of
ng to the natural order Scrophulariaceæ or
. It has a campanulate 4-cleft calyx; the
e corolla galeate emarginate, the lower larger,
the middle lobe emarginate; 4 stamens fertile,
of the upper anthers with a long spur; the
g-ovate, compressed, emarginate, with entire
ds few.

, Euphrasy, Eyebright, has ovate or cordate-
sile serrate leaves, the corolla glabrous, the lobes
p emarginate, of the upper lip patent sinuate-
thers unequally mucronate, hairy. It is from
igh, and is a native of the heaths and pastures
Himalaya mountains, Cashmere, and all the
It is common in Great Britain. This species
bject to variation. The leaves are ovate, or
or cordate-triangular, with the teeth acute or
ng or spreading. The capsule also varies much
ere is scarcely a character permanent except
of the corolla. This elegant little plant has
r and aromatic flavour, and has been employed
ine, particularly in diseases of the eye. Its
mplaints seems to have originated in its bright
d when the doctrine of signs and seals pre-
s supposed to indicate its value in brightening
hough it has lately fallen into disuse, its astrin-
ndoubtedly of value in certain diseases of the
xplain the fact that Professor Kranichfeld has
being useful in catarrhal affections of the eye.
l juice and distilled water of this plant have
in which it has been employed.

es has the leaves narrowed from the base,
r-lanceolate, remotely serrate, the floral leaves
ne flowers, the corolla pubescent, the lobes of
blong obtuse, the anthers with 2 equal points,
native of Europe, and is abundant in Great
dows, corn-fields, and waste places. This plant
Odontites of Hudson, and the *Odontites rubra*

everal other species of Euphrasia; although
none of them will grow well in cultivation.
Manual of British Botany; Lindley, *Flora*

(from εὖ, and πούς, ποδός, a foot), Latreille's fifth
nerous Coleoptera. The great size of the pos-
n many insects of this family, gives rise to the
The genus *Sagra*, many species of which, remarkable for brilliant red, purple, and green colours, are brought from the East, and the genus *Crisceris*, are types of subdivisions of the family.

EUPOMPUS. [PAMPHILUS, P. C.]

EU'RYALE (after one of the Gorgons, in allusion to the threatening armed appearance of the plant), a genus of plants belonging to the natural order Nymphæaceæ. It has a calyx of 4 sepals inserted in the torus and adhering to it; 16-28 petals; numerous stamens; 16-20 carpels; the fruit half-inferior arising from the sepals, petals and stamens adhering half-way up. There is but one species of this genus, *E. ferox*, which is an elegant aquatic covered all over with prickles with large peltate orbicular leaves, and bluish purple or violet flowers, about the size of those of the yellow water-lily. It is a native of the East Indies in the lakes Gumtoe and Gogra, also in the province of Kianang in China. This plant presents a very singular appearance. Its petioles and calyxes are hispid with stiff prickles. The leaves are about a foot in diameter. The root or rootstock contains starch, which may be separated as food, or the root may be eaten, as is done by the inhabitants of the districts where it grows.

In cultivation, this plant must be kept in water in a hot-bed or stove. It will produce seeds if the pollen of the anthers, when it is in full bloom, be shaken on the stigmas. It can only be propagated by means of its seeds.

(Don, *Dictionary of Gardening*.)

EURYNO'TUS, a genus of fossil Ganoid fishes, from the limestone of Burdie House and the shales of Newhaven. (Agassiz.)

EURYO'CRINUS, a genus of fossil Crinoidea, from the mountain limestone. (Phillips.)

EURY'PTERUS (Harlan), a singular genus of fossil Crustacea, from North America and Scotland. E. Scouleri occurs in carboniferous limestone at Kirkton, near Glasgow.

EUSE'BIUS (Εὐσέβιος), bishop of Emesa in Phoenicia, was born in the neighbourhood of Edessa, and belonged to a very illustrious family. He was from his early youth instructed in the principles of the Christian religion, and had the most distinguished teachers of the time. He afterwards devoted himself to the study of theology under the direction of the celebrated Eusebius of Caesarea and Patrophilus of Scythopolis. However, as he wished to avoid being appointed to any ecclesiastical office too early, he went to Alexandria to spend some time in the study of philosophy. On his return from Alexandria he stayed for some time at Antioch, and formed an intimate friendship with Flaccillus, the bishop of that place. In A.D. 341 Athanasius was deprived by the the Synod of Antioch of his bishopric of Alexandria, and Eusebius, to whom it was offered, refused it, though soon after he accepted the bishopric of Emesa. During the solemnity of his ordination the people of Emesa rose against him, charging him with pursuing mathematics and magic. Eusebius took to flight, and for a time he stayed with his friend Georgius, bishop of Laodicea, but afterwards he returned to Emesa, where he was tolerated, owing to the influence of his friend Georgius. He died at Antioch in A.D. 360. Eusebius was a great favourite of the emperor Constantius, who is said to have been accompanied by him on several military expeditions. Some of his contemporaries charged him with favouring the Sabellian heresies; but Sozomen thinks that this accusation was suggested to his enemies only by their envy of his great virtues. Hieronymus even calls him the ringleader of the Arian party, a strong expression, which, from the pen of Hieronymus, must be taken with great caution, for as far as we know, all that can be said is that Eusebius had a leaning towards the views of the semi-Arians. Eusebius was a man of a very cultivated mind and great eloquence: he wrote a great number of works which were well received by his contemporaries; but all of them are lost, with the exception of a few said still to exist in MS. in some libraries. (Socrates, *Hist. Eccles.* ii. 9; Sozomen, iii. 6; Hieronym., *De Scriptor.* 91; Nicephorus, ix. 5.) His Life written by his friend Georgius of Antioch is lost. There exists, under the name of Eusebius, a collection of fifty homilies, which were published in a Latin translation by J. Gagneius, Paris, 1547 (reprinted at Paris, 1561, 8vo., and at Antwerp, 1555); but all critics agree that these homilies are the productions of a much later age than that of Eusebius of Emesa.

(Cave, *Historia Literaria*, vol. i. p. 156, &c.; Fabricius, *Biblioth. Graec.* vii. p. 412, &c.)

EVA'GORAS (Εὐαγόρας), king of Salamis in the island of Cyprus, from B.C. 410 to 375. His family, the Teucridæ, had been deprived of the government of Salamis by a Phœnician, Abdymon, who, with the view of securing himself against the Greeks, placed his usurped kingdom under the protection of Persia, and promised to reduce the whole island under the Persian dominion. During the reign of the usurper, Evagoras spent his boyhood at Salamis without being molested; but when the usurper had been murdered by one of the Cyprian nobles, Evagoras fled to Soli in Cilicia, for the murderer, in order to secure the throne to himself, was anxious to get rid of Evagoras also, who was then a very promising youth, and distinguished for his intellect as well as bodily strength. However, Evagoras resolved to recover the kingdom of his ancestors, and, accompanied by a band of fifty faithful friends, he made a descent upon Cyprus, defeated his enemies, and fully accomplished his object, B.C. 410. Isocrates, to whom we are chiefly indebted for our knowledge of the history of Evagoras, describes him as a man of great talent as an administrator; he restored the fortifications and the harbour of Salamis, built ships, and endeavoured to establish commerce; but his great ambition seems to have been to establish Greek manners and literature in his kingdom. Hence many a Greek exile, especially Athenian, found a welcome reception there; and Conon, after the battle of Ægospotami, in B.C. 405, was most hospitably received by Evagoras. But he could not hope permanently to improve the condition of his kingdom without previously securing himself against any attacks of the Persians. Through the mediation of Ctesias, the physician of Cnidus, a treaty was concluded between King Artaxerxes II. and Evagoras, in consequence of which Evagoras supported the Persians with money and ships in their war against Lacedæmon, and was afterwards honoured by the Athenians with a statue and the Attic franchise. The friendly relation with Persia, however, did not last long, for Evagoras had enlarged his kingdom, partly by persuading the towns of Cyprus, and partly by force. This was against the interests of Persia; several towns solicited the protection of Artaxerxes, who was prevailed upon to declare war against his vassal. Hecatomnus, a dynast of Caria, received the command of the Persian fleet, and Autophradates that of the army; and according to some accounts Artaxerxes himself went to Cyprus, B.C. 391. Evagoras was supported by the Athenians with ships, and other friends advanced him money. But his small fleet was captured by the Spartan Teleutias, almost as soon as it had left the harbour of Salamis. Notwithstanding this misfortune the Persians made no progress, probably because Hecatomnus had already entered into a secret understanding with Evagoras. In the meantime Evagoras concluded an alliance with King Acoris of Egypt, and in B.C. 388 he received from the Athenians a fleet under the command of Chabrias. Thus strengthened, Evagoras in a short time made himself master of nearly all Cyprus, ravaged Phœnicia, and induced Cilicia to revolt against Persia. Artaxerxes, who had reason to dread the further progress of Evagoras, concluded a peace with the Spartan Antalcidas, B.C. 370, in which Cyprus was recognised as a province of the Persian empire. The Athenians accordingly recalled Chabrias and the fleet they had sent to the assistance of Evagoras, who nevertheless refused to submit to Persia, relying as he did on the aid of Acoris. Artaxerxes made great preparations for war. Evagoras was not wanting either in courage or in the means of defending himself, and although the Persians landed an army in Cyprus, Evagoras contrived to cut off their supplies, which caused an insurrection in the Persian camp; and Evagoras, who had increased his fleet to 200 sail, ventured upon a sea-fight off Citium, but he was defeated, and lost many of his ships. Salamis was now blockaded by the Persians by land and by sea, and Evagoras felt that without foreign assistance he must be lost. He therefore left the command at Salamis in the hands of his son Pnytagoras, and went to Egypt to induce Acoris to assist him against the common enemy; but he was disappointed in his hopes. He received indeed a sum of money, but as it was insufficient he entered into negotiations for peace, hoping that he might yet obtain advantageous terms. But Tiribazus, the commander of the Persian fleet, demanded that Evagoras should give up all the towns in Cyprus, pay an annual tribute for his little kingdom of Salamis, and consider the king of Persia as his master. The negotiations were broken off, but Evagoras benefited by the jealousy between the Persian commanders; for Orontes, one of them, contrived to throw suspicion on the conduct of Tiribazus, in consequence of which Tiribazus was recalled and arrested. Some, disturbances which were thereby caused in the Persian army, rendered it easy for E defend himself, and Orontes was induced to conclud with Evagoras, in which the latter was recognised Salamis, on condition of his paying an annual tr obeying the commands of the king of Persia. But A did not sanction the peace, and Tiribazus, who wa to his former post, was ordered to continue the war. Evagoras maintained his position; and the war wi which lasted for ten years, from B.C. 385 to 376, w to a close very honourable to Evagoras. He did survive the conclusion of the peace, for in B.C. 3 then at an advanced age, he was murdered by a eu wife had been seduced by a son of Evagoras. He married to Leto, by whom he was the father of a la He was succeeded by his son Nicocles. (Isocrates, Diod., xiv. 39, 98, 110; xv. 2-9, 47; Photius, 176; Pausanias, i. 3. 2; Xenophon, *Hellen.* iv. 8. totle, *Polit.* v. 8; Lucian, *Pro Imag.* 27.)

From this Evagoras we must distinguish another, likewise king of Salamis, and, so far as chronolo cerned, may have been either a son or grandson Evagoras. He was deprived of his kingdom by tagoras, but recovered it in B.C. 350, with the Persia. Soon after however, some calumnies against ing been brought before the Persian king, he was second time by Protagoras. Evagoras indeed su justifying himself before the king, but instead of pality he received a satrapy as a compensation. quence of his bad administration he was obliged to fled to Cyprus, but was overtaken and put to deat dorus, xvi. 42, 46.)

EVAPORATION is the transformation of a li stance into a gaseous state by the action of heat: to circumstances the effect may take place slowly a any apparent movement of the surface of the li which the vapour rises, or it may take place rapid accompanied by an ebullition.

If any liquid be placed in an open vessel, it will gradually to diminish in quantity by a sensible or evaporation, and it will at length disappear: the vapour proceeding from the same liquid in a give evidently proportional to the area of the exposed but, with equal temperatures, the escape of vapour ferent liquids will be found to take place with dif grees of rapidity. An evaporation of the waters at of the earth is going on at all times, and over the an ocean the aqueous vapour held in the atmospher to an enormous quantity: much of this vapour is p to the earth in dew, rain, &c., but it is probable atmosphere, at any place, is never entirely free from

The whole quantity of vapour which rises from having a given surface appears to depend upon the ture of the liquid; but, in a given time and in the it is influenced by the state of the atmosphere with dryness or moisture: in dry weather, even in win the evaporation is more considerable than in damp but it is greatest when the atmosphere is both dry At equal temperatures, in a close vessel, the evap the same whether the vessel containing the liqui also air or have the air exhausted from it; but in case the quantity of vapour which a given degree capable of raising occupies the upper part of the mediately, whereas in the former a certain time before that quantity is disengaged.

In order to obtain a knowledge of the quantity evaporated in the open air, in a given time, the a being calm, Dr. Dalton suspended some in a cylindri of tin from one end of the beam of a balance and successively to different degrees of temperature by weighed the water before and after each experimen the continuance of which the temperature was const the difference divided by the number of minutes that temperature, the weight of the water evaporate minute from the exposed surface. At the boili (212° Fahr.) the evaporation of water from one squ of surface was found to be equal to 4·244 grains pe and at a temperature expressed by 138° one grain pe between these limits the quantities of the evapora square inch, in grains, are nearly proportional to the in inches, of the columns of mercury, whose we equivalent to the elastic forces of the vapour at the temperatures.

In these experiments no allowance was made for nding on vapour previously existing in the atmosphere, effects being very small compared with the elastic force the vapour rising from the water at such temperatures.

Dr. Dalton, taking f to represent the elastic force of ur in the atmosphere when at the point of saturation, and be the elastic force of the vapour in the actual state of tmosphere, the temperature of the air in both cases being which is indicated by the thermometer at the time of the iment; found that the quantity of evaporation from a inch of surface, at such temperature, was proportional $-f'$, and might be expressed by $\frac{4\cdot844}{30}(f-f')$. (*Man-* r *Memoirs*, vol. 5.) The evaporation from ice has been ained by experiment both by Dalton and Gay-Lussac, und to be equal in quantity to that which, by computa- would take place from water at the same temperature.

Dr. Dalton we owe also the discovery, admitting how- at the aqueous vapour in the atmosphere has no in- e on evaporation, that the quantity of vapour raised from en surface of any liquid, at a given temperature, is ly proportional to the elastic force of the vapour at that rature; therefore, if the elastic forces of the vapours different liquids were correctly ascertained, a near ap- mation, at least, might be made to the amount of evapo- from those liquids. At a temperature equal to 212° r.) the elastic force of the vapour from water is alent to the weight of a column of mercury 30 inches ; the elastic force of the vapour of one kind of alcohol, e weight of a column 68 inches high; and that of the ur of one kind of æther, to the weight of a column 219 s high.

is stated by Mr. Faraday that, at temperatures above 60 degrees (Fahr.), there is a small evaporation from mer- ; at lower temperatures he could detect none; and he udes that, below the temperatures just mentioned, the ity of the particles of mercurial vapour exceeds their ic force. In this material, as well as in all liquids which at high temperatures, the elastic force of the vapour is small. Sulphuric acid, for example, boils at 300° (Fahr.), the elastic force of its vapour at a temperature equal to is only equal to that of water at 110°. Solid substances vapours of such low elasticities, that the highest natural rature cannot convert them into vapour; and hence Faraday concludes that the atmosphere does not contain apours of earthy or metallic substances.

few cases occur in which a body passing from a liquid to id form acquires thereby an increase of temperature, and ost remarkable case is afforded in the freezing of water. e still existing in a liquid state, water has had its tempe- reduced so low, that a Fahrenheit's thermometer in it ted no more than 5°; but on being made to crystallize, tation or otherwise, so much caloric was immediately d, that the thermometer rose to 32°. But when, by ation, a liquid is transformed into a vapour, heat is ted and a thermometer in the liquid indicates a depres- temperature, or the liquid becomes cooled. In India, produced by exposing water during the night in flat un- earthen vessels resting upon any imperfectly con- g substances, as sugar-canes, dry stems of maize, and ke. The dryness of the air allows a considerable ation to take place, and a thin film of ice is produced. r processes are employed in other countries for the e of reducing the temperature of liquids. [Cooler, S.]

the pressure of the atmosphere on the surface of a prevents, in a great degree, the evaporation from taking ; the conversion of a liquid into a vapour is therefore ated by placing the vessel containing the liquid under eceiver of an air-pump and extracting the air: but the r itself acts by its elastic force on the surface of the , and impedes, at least for a time, the escape of more a certain quantity; consequently the cooling process be greatly accelerated by employing some means of ab- ng the vapour as fast as it is formed, thus allowing the tion to go on without impediment. The means of shing this end were discovered by Sir John Leslie, ced a shallow open vessel containing sulphuric acid te of lime along with the vessel containing the water ich an evaporation was to take place under the receiver e air-pump; when the vapour was absorbed as it rose, the water was speedily converted into ice. [Freezing aratus, P. C. S.; see also Cryophorus, P. C. S.]

f a glass bottle containing water be covered with a cloth ch is kept constantly wet by the application of water the evaporation from the wet cloth will soon diminish the temperature of the water which is in the bottle. A similar effect is produced, but in a higher degree, on moistening the bottle with some spirit, as alcohol; and if a cloth dipped in alcohol be applied to the ball of a thermometer, the mercury in the tube will descend while the evaporation continues: the cooling is found to be so much greater as the spirit is more volatile; and it appears to be the greatest when æther is employed.

The degree of cold thus produced is increased by any means which will accelerate the evaporation: thus, by wrapping a piece of linen dipped in æther round the ball of a mercurial thermometer and exposing the apparatus to a current of air, the mercury in the tube has been made to fall as much as 45 degrees. Dr. Cullen (*Essays, Physical and Literary*) of Edinburgh put a small quantity of water into a thin glass tube which was suspended in a vessel containing æther; and then, on placing the apparatus under the receiver of an air-pump and rapidly exhausting the air, the evaporation of the æther caused such a diminution of heat in the water that it was converted into ice. By a similar process, using sulphuret of carbon instead of æther, Dr. Marcet (*Phil. Trans.*, 1813) succeeded in freezing mercury.

EVERDINGEN, ALDERT VAN, a very able Dutch landscape painter and etcher, born at Alkmaar in 1621. He studied under Roland Savery and Peter Molyn, known as the Cavaliere Tempesta, and he surpassed them both. The wild and the rugged is the prevalent style of his landscapes, and chiefly from Norwegian scenery; he spent upwards of a year in Norway, and took the greatest delight in sketching the wild scenery of its rugged coast. Everdingen was excellent also in sea-storms, and in all his works showed himself a master of aërial perspective. Some of his fine forests are extremely true and picturesque, and he excelled in figures and animals. He died at Alkmaar in 1675. Everdingen's etchings are numerous, but scarce; among them are a series of one hundred Norwegian landscapes, and a series of fifty-six original illustrations to the celebrated Dutch fable of 'Reynard the Fox:' his plates are generally marked A. V. E.

Aldert's elder brother, Cæsar van Everdingen, was likewise a clever painter, and an architect; he painted history and portrait. He was born at Alkmaar in 1606, and died there in 1679.

(Houbraken, *Groote Schouburg*, &c.; Bartsch, *Peintre-Graveur*.)

EVERNIA. [Liverworts, P. C. S.]

EVIDENCE. [Evidence, P. C.] In 1843 an act was passed (6 & 7 Vict. c. 85), entitled 'An Act for improving the Law of Evidence,' which enacts, 'That no person offered as a witness shall hereafter be excluded by reason of incapacity from crime or interest from giving evidence, either in person or by deposition, according to the practice of the court, on the trial of any issue joined, or of any matter or question or on any inquiry arising in any suit, action, or proceeding, civil or criminal, in any court, or before any judge, jury, sheriff, coroner, magistrate, officer, or person having, by law or by consent of parties, authority to hear, receive, and examine evidence; but that every person so offered may and shall be admitted to give evidence on oath, or solemn affirmation in those cases wherein affirmation is by law receivable, notwithstanding that such person may or shall have an interest in the matter in question, or in the event of the trial of any issue, matter, question, or injury, or of the suit, action, or proceeding in which he is offered as a witness, and notwithstanding that such person offered as a witness may have been previously convicted of any crime or offence: provided that this act shall not render competent any party to any suit, action, or proceeding individually named in the record, or any lessor of the plaintiff, or tenant of premises sought to be recovered in ejectment, or the landlord or other person in whose right any defendant in replevin may make cognizance, or any person in whose immediate and individual behalf any action may be brought or defended, either wholly or in part, or the husband or wife of such persons respectively; provided also, that this act shall not repeal any provision in a certain act passed in the session of parliament holden in the seventh year of the reign of his late majesty and in the first year of the reign of her present majesty, intituled "An Act for the Amendment of the Laws with respect to Wills:" provided that in courts of equity any defendant to any cause pending in any such court may be examined as a witness on the behalf of the plaintiff or of any co-defendant in any such cause, saving just exceptions; and that any interest which such defendant so to be examined may have in the matters or any of the matters in question in the cause shall not be deemed a just exception to the testimony of such defendant, but shall only be considered as affecting or tending to affect the credit of such defendant as a witness.' This act does not extend to Scotland.

It is provided by numerous statutes that various certificates, official and public documents, and certified copies of such documents, are to be received in courts of justice, but in some cases a difficulty was experienced in proving that such documents were genuine. In 1845 an act was therefore passed (8 & 9 Vict. c. 113) which provides that in future official and other documents 'shall respectively be admitted in evidence, provided they respectively purport to be sealed or impressed with a stamp, or sealed and signed, or signed alone, as required, or impressed with a stamp and signed, as directed by the respective acts made or to be hereafter made, without any proof of the seal or stamp, where a seal or stamp is necessary, or of the signature, or of the official character of the person appearing to have signed the same, and without any further proof thereof in every case in which the original record could have been received in evidence.' This act will apply to the documents or proceedings of any corporation, or joint-stock or other company, or any certified copy of any document, by-law, entry in any register or other book. Courts of justice and persons judicially acting are required by the act to take judicial notice of the signature of the equity or common law judges attached to any decree, order, certificate, or other judicial or official document. Copies of private and local and personal acts which purport to be printed by the Queen's printers are in like manner admissible, also copies of the journals of either House of Parliament, and royal proclamations which purport to be printed by the printers to the crown, or by the printers of either House of Parliament. Persons who forge the seal, stamp, or signature of documents, or print any private act with a fraudulent intent, are guilty of felony and liable to seven years' transportation, or imprisonment for a term not less than one and not exceeding three years. The act does not extend to Scotland.

EVO'DIA (from εὐωδία, a sweet smell), a genus of plants belonging to the natural order Rutaceæ. It has the calyx 4-5-parted; 4-5 equal petals; 4-5 stamens, smooth; the filaments subulate; the anthers heart-shaped, moveable; the disk cup-shaped, sinuated; the ovary single, deeply 5-lobed, with 2 collateral ovules in each cell; the style single, very short; the stigma terminal, obtuse; the cocci 2-valved, 1-seeded, with a separable 2-valved endocarp. The species are shrubs and trees, with a grateful smell.

E. febrifuga is a tree and has trifoliate leaves, the leaflets lanceolate elliptical, somewhat acuminate; the panicle terminal, downy; the ovary simple, warted. It is a native of the forests of the province of Minas Geraes in Brazil. The bark and young wood are bitter and astringent, and are employed by the medical practitioners of Brazil as a tonic and febrifuge.

E. hortensis has simple or trifoliate leaves, which are pubescent as well as the branches. It is a native of the Friendly Islands and the New Hebrides. *E. drupacea* has smooth leaflets and a four-seeded drupaceous fruit. It is a native of New Caledonia. The two last are shrubs. All the species are worth cultivation on account of their agreeable scent. They may be grown in a mixture of loam, peat, and sand, and propagated by means of cuttings, which should be allowed to strike root under a handglass in heat.

(Lindley, *Flora Medica*; Don, *Gardener's Dictionary*.)

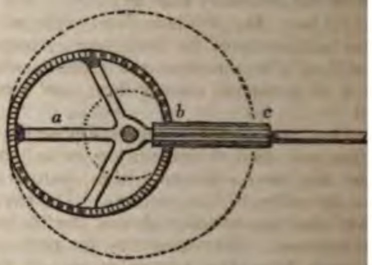
EXCÆCA'RIA, a genus of plants belonging to the natural order Euphorbiaceæ. It has monœcious or diœcious amentaceous flowers; the sterile flowers nothing but staminiferous bracts; the stamens 7-9, united into about three parcels, all connected at the base; the fertile flowers with the calyx 3-fid or absent; the style 3-parted; the capsule 3-coccous.

E. Agallocha is a small crooked stunted tree, with alternate leaves about the extremities of the branches, stalked ovate or cordate, but usually acute at the base, smooth on both sides, remotely and slightly serrate, pointed with two glands at the base, and about two inches long; the petioles about an inch long, smooth, channelled; the stipules small, fine-pointed. The trunk of this plant abounds in a virulently acrid milk, which acts as a powerful poison. Roxburgh says that woodcutters who accidently injure this tree have inflammations and ulcerations on those parts of the body where the milk touches. Rumphius calls this tree 'Arbor excæcans,' and says that the Dutch sailors who were sent ashore at Amboyna to cut down timber became furiously mad from the pain produced
by the juice of this tree getting into their eyes, an
of them lost their sight altogether. This tree is
various parts of the continent of India, and in
islands, especially near the coast. Its specific na
to have been given it on the supposition that it was
plants that yielded the Agallochum, or Aloes-woo
is not the case, and this wood is yielded by a diffe
of plants. [Aquilariaceæ, P. C. S.]

(Lindley, *Flora Medica*.)

EXCENTRIC, or ECCENTRIC, in machin
of wheel, or revolving cam, in which the axis
motion does not coincide with the geometrical
which the periphery is not circular. A genera
such contrivances, and a representation of the kind
employed for working the valves of a steam-engin
under Wheels, P. C., p. 315.

Excentrics of various kinds form an important
chanical expedients for converting one kind of
another. They afford means for converting contin
motion, in various ways, into alternating or intermi
linear motion, or into curvilinear, though not rotat
They also furnish means for producing, from
speed of one revolving shaft, rotatory motion of
varying speed in shafts placed in connexion with
illustration of such an application, Professor W
'Principles of Mechanism,' refers to an excen
wheel contrived by Huyghens to produce some
plex movements of a planetarium. The subjoin
will illustrate the action of this apparatus, *a* repr
crown-wheel, which is mounted excentrically



which revolves with a uniform speed, and *b c* a pi
by it, and made so long that it may be acted upo
that portion of the periphery of the crown-wh
nearest to its axis, and which describes in its revol
indicated by the small dotted circle, coming in
the pinion at *b*, or by the opposite portion of the
which describes the path indicated by the large d
and engages the pinion at *c*, where it is intersec
circle. As the distance from the axis of the crow
the point *b* is little more than one-third of the di
the axis to *c*, and as the velocity of the axis or shaft
it follows that the pinion will be driven nearly th
fast when in contact with that part of the perip
crown-wheel which lies farthest from the axis as w
tact with the part which intersects it at *b*, while
mediate portion of the periphery of the crown-
impart a different, but intermediate velocity. S
bination of wheels might be driven by the pinion
case, supposing the pinion to have a uniform veloc
the crown-wheel, or rather of its axis, will vary.
variations might be introduced by making the p
the crown-wheel of other than a circular form.

Excentrics may be driven by bands or straps;
the bands be very highly elastic, it is necessary
stretching pulley or roller, which may be pressed
strap by the action of a weight, to maintain a unifo
of tension.

EXCENTRIC WHEELS. [Wheels, P. C.,

EXCHANGE. The rules by which operati
change are conducted must be either the simple ru
or the chain rule. [Chain Rule, P. C. S.]

In the simple and direct operation nothing but
three can be required. Thus, the exchange betwe
and Paris being 25 francs 55 centimes to the poun
6732 francs is converted into English money by f
fourth term of the following:—

25·55 : 1 :: 6732 : the answer.

and 139*l*. 14*s*. 6*d*. can be converted into French mo

1 : 25·55 :: 139*l*. 14*s*. 6*d*. : the

But in the case of the indirect operation of passi one country into another through a third, a double ope- of the rule of three is requisite, which may be facili- by the use of the chain rule. Suppose, for instance, ie exchange between London and Paris is 25·55 francs pound sterling, and that the exchange between Paris Hamburg is 100 marks to 189 francs. Then, to find e *arbitrated* value (as it is called) of 139*l*. 14*s*. 6*d*., re- l to Hamburg through Paris, we have

100 marks are worth 189 francs
25·55 francs ,, 1 pound
139*l*. 14*s*. 6*d*. ,, How many marks?

s however more common, first to establish an arbitrated f exchange, by putting 1*l*. in the place of 139*l*. 14*s*. 6*d*., hen deducing the value of the latter sum. This is more nient, because it establishes a rate once for all until the nges vary.

t the student must not content himself with the simple ition above given. There are many little matters of ss which cannot be explained here, but which may be in such works as Tate's 'Commercial Arithmetic,' and Counting-House Guide' of the same author.

CHANGE, BILL OF. [Bill of Exchange, P. C.]

CHANGE, ROYAL, London. The late Royal Ex- e which was burnt down on the night of January 10, has been fully described under Royal Exchange,

The foundation-stone of the present structure was y Prince Albert, January 17, 1842, and the building ompleted in less than three years, the new Royal Ex- e having been opened October 28, 1844, by Queen ria, accompanied by Prince Albert, and attended by the ipal officers of the court and city.

e architect was Mr. William Tite. The whole of the ior of the building is of Portland stone, except the steps the plinths of the columns and pilasters, which are of te. It is of a simple oblong form, and stands nearly nd west.

the west end is a portico octostyle diprostyle, or of eight ns in front and two columns in projection, or in depth, there are also two columns within, behind each third n from the sides of the portico. The front is deeply sed behind the two middle columns, and in the centre is principal entrance. The ascent to the portico is by nine granite steps from the triangular area in front where trey's bronze equestrian statue of Wellington is placed.

e east front has four columns in the centre, the two e columns free, the two outer each engaged with a r. Above these columns is the clock-tower, the first of which is square with ornamented pilasters, the second circular with Corinthian columns, crowned by a dome, urmounted by a vane formed of the grasshopper of the Royal Exchange, which is of copper, and eleven feet it was little injured by the fire, and has been repaired ilt. The height to the top of the vane is 177 feet; to p of the dome is considerably less. The eastern entrance eath the clock-tower. The east end is connected with des by semicircular corners.

e south side is an unbroken line of pilasters and boldly ting cornice, crowned by a balustrade and attic. There fty semicircular arches between the pilasters, and each forms a shop front on the ground floor and window for r above, except near the centre, which is recessed, and n entrance from the south.

e north side differs considerably from the south. The e part projects a little, and has pilasters similar to those he south side, but there are no pilasters on what may be d the wings of this south front. In the centre of the cting part is an entrance from the north, opposite to the h entrance. The cornice and balustrades are similar to on the south, but the line is of course broken by the ral projection.

he windows which light the principal rooms of the Royal hange from the exterior, form a single range, of similar e on both sides of the building, but with considerable vari- n in the details.

he length from the portico west to the columns east is 308 ; the width of the west end is 119 feet, of the east end feet. The portico is 96 feet wide and 74 feet high to apex of the pediment; the columns, which are 4 feet ches in diameter at the base, are 41 feet high, including and capital.

the interior is a central quadrangular area appropriated he meetings of the merchants, 170 feet by 112 feet, of h 111 feet by 53 feet is uncovered; the four covered sides form the ambulatory, the ceiling of which is divided by beams and pannelling, and both ceiling and sides have been painted in encaustic by Sang, a German artist and his assistants. The quadrangular front of the ambulatory is formed of semicircular arches which spring from square pillars. On the front of each pillar projects a half column with a plain capital, over which are half columns with Ionic capitals, with arches and ornamented windows between, and surmounted by a cornice and pierced parapet. Besides the central area, there is a small court at the east end.

The principal floor is occupied by four suites of apartments, of which the east end of the building and the chief part of the north side is appropriated to the underwriters' establishment of Lloyd's, and contains several handsome apartments. The subscribers' room, which extends along the east end, is 100 feet long by 48 feet wide; the commercial club-room, for strangers visiting London for mercantile purposes, is on the north side, 80 feet long: they are two magnificent apartments. The greater part of the west end is appropriated to the Royal Exchange Assurance Offices, and most of the south side is occupied by the London Assurance Company.

The best view of the Royal Exchange is from the south-west, where the mass of building is seen obliquely in its whole length along the unbroken line of pilasters and cornice, together with the large portico and sculptured pediment; and thus seen in the simplicity of its outline is a structure of much grandeur. Viewed more in detail from other places, it is less worthy of admiration. The arches which form the shop-fronts on both sides and at the semicircular corners appear flat and unsightly; the windows above are profusely ornamented, but the mouldings are such as to produce an effect not rich but gaudy, not magnificent but heavy. The columns and pilasters of the exterior are Corinthian; and the shafts, which are all plain, do not harmonize well with the profuse decoration of the dressings of the windows. The sculpture of the pediment is by the younger Westmacott: the grouping is rich in general effect, but the figures are somewhat too much crowded for distinctness, and there is perhaps too much of the classical forms of drapery in the national costumes worn by the persons arranged on each side of the central figure of Commerce. The sculpture is executed in close-grained limestone. Most of the figures are detached, the rest in high relief, and the modelling and chiselling are excellent. The clock-tower is not inelegant, but viewed from the exterior it appears small and insignificant, and in most situations is not seen; viewed however from the west side of the interior quadrangle, it looks very well. The clock was made by Dent, under the direction of Professor Airy, and the first stroke of each hour is said to be true to a second of time. The general appearance of the architecture of the interior is not unpleasing, though the ornamental mouldings viewed in relation to each other and to the style of architecture, display a good deal of bad taste. The encaustic painting of the ambulatory has a very novel, rich, and agreeable effect. The central area was at first paved with encaustic bricks, but is now flagged, except two small portions on the north and south sides. The flagstones of the ambulatory are of different colours and are arranged in symmetrical forms, but the contrast of colour is not sufficiently strong to produce any striking effect.

In the north-east angle of the ambulatory is a statue of Queen Elizabeth by Watson, and in the south-east angle a statue of Charles II. which stood in the centre of the area of the late Royal Exchange, and escaped with little injury from the fire. In two niches which occupy the place of windows in the projecting front of the north side are two statues, one of Sir Hugh Middleton by Joseph, the other of Sir Richard Whittington by Carew, both habited in the costume of their times, and of excellent design and execution. A statue of Sir Thomas Gresham by Behnes is to be placed in a niche at the east end, similar to those of the north front; and a marble statue of Queen Victoria by Lough, which was exhibited in the Royal Academy this year (1845), is to be placed in the centre of the quadrangular court. The drapery of this statue appears heavy and ungraceful. The artist seems to have aimed at a grandeur of effect which was not produced in the exhibition-room, but the appearance may be improved when the statue is placed upon its pedestal in the central area.

(Wilson's *Description of the New Royal Exchange*; *Companion to the Almanac*, 1842 and 1844.)

EXCHEQUER CHAMBER. [Courts, P. C.; Exchequer Court, P. C.]

EXCHEQUER COURT. [Exchequer Court, P. C.] Several alterations have been made in this court, the most im portant of which is the abolition of the equity side of the court, which was effected by 5 Vict. c. 5. The duties which formerly devolved upon the Masters of the court of Exchequer are now performed by the Queen's Remembrancer, whose office was regulated by 5 & 6 Vict. c. 86. [ACCOUNTANT-GENERAL, P. C. S.] This act also abolished certain offices on the revenue side of the court. By a previous act (3 & 4 Wm. IV. c. 99) the following offices of the court were abolished: the lord treasurer's remembrancer, the filacer, secondaries, deputy-remembrancer, and sworn and other clerks and bag-bearer belonging thereto; clerk of the pipe, controller and deputy-controller of the pipe, secondaries, attorneys, or sworn and other clerks and bag-bearer in the office of the pipe; clerk of the estreats; surveyor of the green wax; the foreign apposer and deputy foreign apposer, and clerk of the nichills.

EXCRETION. [SECRETION, P. C.]

EXECUTORY DEVISE. [WILL AND TESTAMENT, P.C.]

EXEMPLIFICATION. [RECORD, P. C.]

EXI'DIA. [TREMELLINI, P. C.]

EXO'STEMMA (from ἔξω, without, and στέμμα, a crown), a genus of plants belonging to the natural order Cinchonaceæ. It has an obovate 5-toothed calyx; a corolla with a terete tube, and a 5-parted limb with linear segments; the anthers linear, exserted; the capsule crowned by the calyx, dehiscing from the apex through the dissepiments into two half-fruits; the seeds girded by a membranous entire border. The species are trees or shrubs, with lanceolate oval short-stalked leaves, and stipules solitary on each side of the petioles.

E. caribæum, Quinquina Piton, Sea-side Beech, has ovate-lanceolate, acuminated, glabrous leaves; axillary 1-flowered pedicels, rather shorter than the petioles; the calyx bluntly 5-toothed; the style and stamens about equal in length to the corolla. It is a tree about twenty feet high, and a native of the Caribbee Islands, Guadaloupe, St. Domingo, Jamaica, Santa Cruz, and Mexico. This plant is the *Cinchona caribæa* of Jacquin and the *C. Jamaicensis* of Wright. The capsules before they are ripened are very bitter, and produce a burning itching when applied to the nostrils and lips. The bark is also bitter, and possesses a tonic, febrifuge, and emetic action on the system, but it does not appear to have either quinine or cinchonine in its composition. The bark is generally smooth and grey on the outside. Its flavour, according to Dr. Wright, is at first sweet, with a mixture of the taste of horse-radish and aromatic oils, but afterwards it becomes excessively bitter and disagreeable. When examined by the microscope it presents innumerable shining crystalline points, which, according to Guibourt, are some principle peculiar to the bark.

E. floribunda, Quinquina of St. Lucia, has elliptic acuminated glabrous leaves; peduncles terminal, corymbose; flowers smooth; the teeth of the calyx short, acute; the capsules turbinate. It is a native of the West India islands, among woods by the side of torrents. It is the *Cinchona floribunda* of Swartz; *C. Sanctæ Luciæ* of David, *C. montana* of Badier, and *C. Luciana* of Vittmann. The bark is similar to the last, and used as a substitute for the Peruvian bark, but Pelletier and Caventou discovered no quinine or cinchonine in any part of the plant.

E. Souzanum, Quinquina de Piauhi, has leaves obovate or ovate, acute, smooth; the corymbs few, flowered, terminal; the capsules scarcely an inch long, obovate, compressed, the valves usually 4-nerved; the seeds transversely oblong, with a broad wing all round. This plant is a native of Brazil, and is used as a substitute for the Peruvian bark. Buchner found in it an alkaloid, which he called Esenbeckine, on the supposition that this plant was an Esenbeckia. The alkaloid was probably cinchonine.

E. Peruvianum is the *Cinchona Peruviana* of Poiret. It has ovate-oblong acute leaves, rounded at the base, the upper sessile and cordate. It is a tree ten or twelve feet high, and grows in the colder parts of Peru, on the declivities of the Andes, between the river Chota and the village of Querocotillo, 3000 feet above the level of the sea. The bark is very bitter, and has a sweetish taste with a nauseous smell. There are several other species of Exostemma, which have also been used as cinchona barks, but the above are those which are best known.

(Don, *Gardener's Dictionary*; Lindley, *Flora Medica*; Bischoff, *Medicinisch-Pharmaceutische Botanik*.)

EXOSTOSIS (ἐξόστωσις), a swelling or tumor of a bone. This term has been applied very generally to all tumors of the bones, whether they partake of the characters of osseous
structure or not. This led to the distinguishing th
ings into true and false, the former including tru
structures, the latter the various forms of cartilagino
spina ventosa, and those diseases of the periosteum
called by Sir Astley Cooper periosteal and medull
tosis. True exostosis is in fact nothing more than
trophy of the tissues which constitute the bone. Hyp
of a bone may arise from natural causes, and is pro
anything which constantly increases the action of a
is thus that the same actions which increase the si
muscles of a blacksmith's arm and a dancer's leg w
attended with an increased development of the bo
ments of the same muscles. During rapid growth
times happens that one part of a bone grows fa
another, from some increased facility of nutrition in
and the consequence is an exostosis. This often
the clavicle of children, but requires no treatment,
quent growth removes the deformity.

The more frequent cause of an exostosis, which do
treatment, is the production of increased action of th
the application of some stimulus. It is difficult fr
in bones, to trace the increased action to the true
sometimes however follows a blow, and some perso
predisposed to take on this form of action, that sligh
are followed by exostoses. The structure and dens
ostoses vary much. Sometimes they exhibit a ligh
structure, like the cancellated structure of bones, an
quently much lighter and more cancellar than is ever
in this structure in its normal development. At ot
the structure of the exostosis is much harder than
bone, and possesses all the characters of ivory. Th
lated structures sometimes attain a considerable siz
ivory exostoses seldom exceed the size of a bean. Th
most common on the long bones, as the femur, tibia,
the last on the cranium, and bones of the face. S
the increased action of the tissue extends to the wh
and every part is enlarged. Remarkable examples
thickening of the whole of the cranium occur in the
of the Royal College of Surgeons and University Co

Exostoses are easily distinguished from other swe
their being fixed and immoveable, and at first unatte
any pain or inconvenience. They are also distingu
the slowness of their growth. Where exostoses are
on parts of the skeleton in which they do not inter
other organs, they may be left to themselves. Situ
hind the knee-joint, they have been known to inter
the action of the flexor muscles. The growth of an
from the os-pubis has, by its pressure, rendered th
impervious. An exostosis of the femur has been k
obliterate the femoral artery; in the orbit, to pro
placement of the eye. Cases are recorded in which
tosis of the cervical vertebræ has obliterated the s
artery, and, extending backwards from the lower
produced a fatal impediment to respiration, by its pr
the larynx. No kind of external treatment is ben
any of the forms of exostosis; and when, on account
position, it is thought right to treat them, they mu
moved. The operation consists in sawing or cutting
bony tumor, which may be done by a trephine, Hey'
Liston's cutting pliers. Of course this operation sho
be performed when it can be done without danger
bouring organs. Even when the whole of the projec
not be removed, it will often be found of advantag
away a part.

(Cooper, S., *First Lines of Surgery*; Cooper,
tionary of Surgery; Mayo, *Outlines of Human Pa*
Liston, *Elements of Surgery*.)

EXPLOSION is the sudden displacement of a con
volume of air, or of any gaseous particles, accompani
loud report.

In the well-known experiment with a glass cylinde
one end covered with a thin bladder tightly bound
the column of air incumbent on the bladder suddenly
into the vessel on the rupture of the bladder when
beneath is withdrawn by means of an air-pump; and
lision of its particles with one another or with the sid
vessel produces the vibrations which cause the perc
sound. The particles of steam, in a state of high
when suddenly liberated by the bursting of the vessel
they are contained, produce also a loud report by th
sion with the atmospherical particles about them, o
rush of air into the rarefied space which they have
The elastic gases liberated on the application of fire

ler in a tube, and the heat produced at the same time,
e a rapid displacement of the particles of the surrounding
sphere; and these as rapidly falling back into the vacuum
n and about the fire-arm, cause a loud report by their
ions. A fulminating powder is the cause of a like ex-
on being produced, by means of the gases which are set
in consequence merely of the friction of the particles.

e explosions which, in the atmosphere, accompany a
of lightning, are ascribed to the rush of air into the vacua
uced when the aqueous vapours in large portions of space
me rapidly condensed. The air which thus occupies a
previously void, by dilating ceases to have the power
olding all the vapour in solution, and much of the latter
g condensed, a new vacuum is produced: the neighbour-
ir again rushes in, and again a report follows. These
ns often taking place several times successively, and the
ng sound arising from a succession of reports may then
eard. [Thunder, P. C.]

or the explosion produced by chemical combinations see
onation, P. C.

XTORTION. 'Extortion,' says Coke (Co. Litt., 368,
'is a great misprision, by wresting or unlawfully taking
ny officer, by colour of his office, any money or valuable
g of or from any man, either that is not due, or more than
e, or before it is due.' It is an offence at common law,
ishable by fine and imprisonment at the discretion of the
t. Also, money which has been obtained by extortion
be recovered in an action at law. There are various
tes providing penalties for extortion by sheriffs, under-
iffs, bailiffs, gaolers, clerks of assize, &c.

XTREME AND MEAN RATIO. To cut a line
rding to extreme and mean ratio, *εὐθεῖαν ἄκρον καὶ μέσον
ν τεμεῖν*, is a phrase of Euclid which it is not very easy
xplain from the words of it. The meaning is, to cut a
ght line in such a manner that the whole shall bear to the
ter part the same ratio as the greater part to the less; or
ake the greater segment a mean proportional between
whole and the less. Accordingly the square of the
ter segment must be equal to the rectangle under the
le and the less segment: and Euclid shows how to make
ection in the 11th proposition of the second book.

the whole line be called unity, and if x be the fraction
h is in the greater segment, we must have

$$1-x=x^2, \text{ or } x=\pm\tfrac{1}{2}\sqrt{5}-\tfrac{1}{2}.$$

e sense of Euclid, only the value $\frac{1}{2}\sqrt{5}-\frac{1}{2}$ will solve the
em; and the other root, with the sign changed, solves
llowing problem:—To produce a line in such manner
he part produced may be a mean proportional between
ven line itself and the line made up of the given line
he part produced. Any one who examines Euclid's con-
ion will very easily see the formation of $\frac{1}{2}$, of $\frac{1}{2}\sqrt{5}$, and
ubtraction of the first from the second.

e fraction x cannot be expressed arithmetically, and the
ents are incommensurable. But if a and b be any two
ers, of which a is the less, and if we form a third by
g the two, a fourth by adding the second and third, and
, as in the series $a, b, a+b, a+2b, 2a+3b, 3a+5b,$
$8b$, &c., it is demonstrable that the farther we go the
nearly does the ratio of any one to the next represent
of the less to the greater segment of a line divided in ex-
e and mean ratio. If we begin with 1 and 1, we have
eries 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, &c. &c. Thus
9 inches be divided into 34 and 55 inches, the division
ired is nearly made, for the rectangle has 89×34, or
6 square inches, and the square has 55×55, or 3025
re inches. This process gives us the results of turning

$$1-x=x^2, \text{ or } x=\frac{1}{1+x}$$

$$x=\frac{1}{1+}\,\frac{1}{1+}\,\frac{1}{1+}, \text{\&c.}$$ [Fractions, Continued, P. C.],

then making successive approximations. It is perhaps
worth noting that the nth number in the series 1, 1, 2, 3,
, &c. is the number of ways in which n can be made up
of odd numbers, differences of order counting as different
s: thus 6 can be made up in 8 ways out of odd numbers.
ordingly, the greater n is taken, the more nearly are the
bers of ways in which n and $n+1$ can be composed of
numbers in the proportion of the segments of a line
ded in extreme and mean ratio.

he use of this division in elementary geometry is as a step to dividing four right angles into five equal parts, as in the 10th proposition of the fourth book. In fact, the half of $\frac{1}{2}\sqrt{5}-\frac{1}{2}$ is the sine of 18°, the fifth part of a right angle.

EYCK, HUBERT VAN. This celebrated old Flemish painter, the elder brother and master of John Van Eyck, was born, according to Van Mander, in 1366, and probably at Eyck (now Alden Eyck), a small village near Maaseyck on the Maas. The two brothers established themselves first in Bruges and afterwards in Ghent. The name of Hubert Van Eyck is nearly lost in that of his younger brother and pupil John, apparently from no other reason than that John alone is mentioned by Vasari in his story of the invention of the new method of oil-painting, while he takes no notice whatever of Hubert; John's name therefore appears as the principal or indeed sole name in all subsequent investigations relating to the origin of this method of oil-painting, and the joint productions of the two brothers are generally adduced as the works of John alone.

Whether the discovery in question was the result of their joint experiments or solely the work of John, it is perhaps now impossible to ascertain; yet as the earliest works in oil were their joint productions, it is scarcely just, on no better authority than an anecdote of Vasari's, to deprive Hubert of the merit of a share either in the discovery or its development.

Van Mander says that they must have painted in their new method as early as 1410, and as Hubert did not die until the 18th of September, 1426, according to the inscription on his tomb in the church of St. Bavon at Ghent, they worked a sufficient number of years together to completely develop it in practice. John Van Eyck cannot have been very old in 1426, as, according to an authentic lottery notice of his widow, though alive in 1445, he died before the 24th of February, 1446, and he was still young when he died, according to Marcus Van Vaernewyck, who published a 'History of Belgium' in 1565. This is somewhat corroborated by a portrait of John in the Museum of Berlin, dated 1430, in which he appears about thirty-five years of age. John was therefore about thirty years younger than his brother Hubert, supposing the latter to have been born in 1366, and accordingly he can have been at first little more than the assistant of Hubert in their masterpiece, the great altar-piece of St. Bavon's, Ghent, which was finished by John in 1432. His name is clearly subordinate to Hubert's in the inscription on the work, which is as follows, the last verse being a chronogram:—

> 'Pictor Hubertus e Eyck, major quo nemo repertus
> Incepit; pondusque Johannes arte secundus
> Frater perfecit, Judoci Vyd prece fretus
> VersV seXta MaI Vos CoLLoCat aCta tVerI.'

The capitals in the last line when added together according to their value as Roman numerals, make 1432.

The merit of Hubert is still more prominently set forward in the following epigram by Vrintius in Saunderus's 'Flandria Illustrata:'—

> 'Quos Deus ob vitium paradiso exegit, Apelles
> Eyckius, hos Vitii* reddidit aere patres.
> Arte, modoque pari pariter concurrere visi,
> Aemulus hinc pictor, fictor et inde Deus.'

The altar-piece is about fourteen feet wide by twelve high, and is in two horizontal divisions, each centre covered by revolving wings or doors, two on each side. There are twelve pictures in all; God the Father, with the Virgin, and Saint John the Baptist, as large as life, one on each side in distinct compartments, constitute the upper centre; the extreme wings of this division are full-length naked figures of Adam and Eve, Adam on the right and Eve on the left of the centre: the interior wings represent, on the right hand, angels singing, on the left, angels playing musical instruments. The lower centre represents in one picture the actual Adoration of the Lamb in small figures; the two wings to the right represent the just judges, Justi Judices, and the soldiers of Christ, Christi milites; the two on the left, the holy hermits, Heyremiti Sti. and the holy pilgrims, Perigrini Sti: there are in all about sixty figures and three hundred heads. An elaborate copy of it was made by Coxie for Philip II. of Spain. [Coxie, Michael, P. C. S.] The colouring of the whole work is beautiful, and many parts are admirably executed, and the painting is still in excellent preservation, owing to the excellent oil vehicle discovered by the Van Eycks.

This medium of the Van Eycks was not merely *oil*: it was several oils mixed with resins, or some such substances, and prepared by fire. Many useless and intemperate discussions have arisen from Vasari's attributing the invention of *oil-painting* to John Van Eyck, but they are due chiefly to a careless or partial consideration of what Vasari really says. In one passage in the Life of Antonello he fully describes, though in general terms, what the Van Eyck medium was, but in others he merely terms it *oil-painting*, a term, after what he had said before, sufficiently characteristic and distinctive. The Cav^{e} Tambroni, however in his preface to the treatise of Cennino Cennini (Rome, 1821), has, with as little ability as honesty, argued solely upon the general expressions of Vasari, and ridiculed the story as an absurd fiction, because mere oil-painting was known in Italy before it was introduced by Antonello of Messina. [Antonello da Messina, P. C. S.] It is true that Cennino Cennini wrote his book in 1437, and it contains five chapters on *oil-painting*, but he prefaces his remarks by the following observation:—'I will now teach you to paint in oil, a method much practised by the Germans.' The oil-painting which Cennino teaches is no more that of the Van Eycks than tempera painting is; it is the very method which the Van Eycks superseded. An old German monk of the name of Tutilo or Theophilus wrote on the same subject centuries before Cennini. [Tutilo, P. C.] The words of Vasari are—'At last, having tried many things, separately and compounded, he discovered that linseed and nut oils were the most siccative: these therefore *he boiled with other mixtures*, and produced that varnish (vehicle) which he, and indeed every painter in the world, had long desired.' This is what the Cav. Tambroni and others have treated as an assertion that John Van Eyck invented and introduced the practice of mixing colours with oil. Several interesting notices of the brothers Van Eyck appeared in the *Messager des Sciences et des Arts*, Gand, 1824; and in the *Kunsblatt* in 1824 and 1826; see also Passavant, *Kunstreise*, &c. (in which there is an outline of the altar-piece of Ghent); and Rathgeber, *Annalen der Niederländischen Malerei*.

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* Judocus Vyd.

EYES, PROPAGATION BY. The power of propagating plants by any other means than seeds depends entirely on the presence of leaf-buds or '*eyes*,' as they are technically called by gardeners. A plant may in fact be regarded as a congeries of individuals, and each leaf-bud is an individual capable of maintaining an independent existence. Though this is generally true, the buds of all plants will not grow when removed from their parent stock. Many, however, admit of their buds being removed from one branch and placed upon another, which constitutes the process of budding. [Budding, P. C.] Others admit of a branch being removed and placed in the ground, when the leaf-buds upon it will develop, and the wood of the branch form roots. Such branches are called cuttings. [Cutting, P. C.] A few plants admit of single buds being taken and planted in the earth, when they will grow and produce plants in the same manner as seeds. It must however be borne in mind in this case that the individual and not the species, as is the case with seeds, is propagated. The plants which are most frequently propagated by eyes are the potato and the vine. It appears that for plants to grow in this manner, the bud requires that a due supply of nutriment should be stored up in the branch or part of the stem to which it is attached. This is undoubtedly the case in the potato, where a large quantity of amylaceous matter is stored up in the tubers, so that a bud cannot be taken without carrying away fragments of its alimentary secretions. Mr. Knight observed with regard to the buds of the vine, that those grew with most rapidity and strength
were in contact with the largest quantity of alburnum
he regards as the nutritious matter of the young bud
provision, however, of alimentary matter may be i
cases, as has been pointed out by Dr. Lindley, d
tageous by promoting too great a development of st
leaves. According to theory, the more nutritive matt
is for the eyes, the greater crop there will be; an
would seem that it would be more advantageous
whole potatoes than portions of the potato or se
Lindley proved by a series of numerous experiments,
weight of potatoes per acre is greater under equa
stances from sets than from the whole tubers by up
from seven cwt. to three tons per acre, and consider
on comparison of the clear produce after deducting th
of sets employed in both cases. He supposes 'the
of the vegetation from the whole tubers to be the
the diminished crop; for the stems were unable to supp
selves, and were blown about, laid, and broken by th
A curious fact with regard to the growth of the
different parts of the potato has been recently point
the 'Gardener's Magazine.' It is well known to
vators of potatoes in Lancashire that different eyes g
and yield their produce at very different times, some b
or fit for use as early as the middle of May, and other
June or July. It is found that it is the sets which a
the extremity of the potato which ripen soonest; a
are planted in Lancashire in warm places, in Mar
beginning of April, and are ready for the marke
middle of May. The produce of the next sets are
fortnight after, and that from the root end still later.

In propagating the vine by this means an eye is ta
a small portion of the stem adhering to it, and is
earth with a bottom heat of 75° or 80°. It should b
a damp atmosphere, when it speedily shoots upwar
branch, and at the same time establishes itself in th
the development of roots. In order to insure the s
this operation, it is necessary that the bud should be
at the time it is removed, and that a small piece
ripened wood should be separated with it.

There is another mode of propagating plants r
this, and that is by planting the abortive branche
'Knaurs,' and embryo buds. [Tissues, Vegetabl
This plan is pursued in Italy for the propagation
trees. These knobs or abortive branches are pro
other trees besides the olive, and might be made u
the same purpose. The beech, the poplar, the c
many other trees produce these knobs in abundanc
country.

It has been found that under certain circumstanc
leaves are capable of producing buds, and these buds
ducing an entire plant. Although it was announce
beginning of the last century, by Agricola in Germ
Bradley in England, that plants might be propagate
extent by means of leaves, there can be no doubt th
object was to impose upon the public, and none of
vantages which they represented to be derived from th
have followed upon its repetition. The fact of bud
been produced upon the veins of leaves is interesting
phological point of view, but no practical applicatio
present been made of it that we are aware of.

(Lindley, *Theory of Horticulture*; *Horticultural
actions*, vols. i. ii.; *Gardener's Magazine*, vol. i. an

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F.

FABBRO'NI, A'NGELO, born at Florence in 1732, studied at Rome, where he distinguished himself for his ability in Latin composition, through which he became acquainted with the learned Bottari, who introduced him to the Papal Court. In 1766 Fabbroni published the first volume of his Latin biographies of the learned men of modern Italy: 'Vitæ Italorum doctrina illustrium,' a work which he afterwards extended to twenty volumes, 8vo., and for which he has been styled by some the Plutarch of modern Italy. His patron Bottari not being on friendly terms with the Jesuits, who had great influence at Rome under Pope Clement XIII., and who accused Bottari of a bias in favour of the Jansenists, Fabbroni found that he had little chance of making his way at the Papal Court, and he returned to Florence in 1767, where the Grand-Duke Leopold appointed him President of the Collegiate Church of S. Lorenzo, and afterwards made him Prefect of the University of Pisa, and Prior of the military order of S. Stefano. After this Fabbroni travelled through Germany, France, and England, and made the acquaintance of many learned men in those countries. On his return to Tuscany in 1773, he devoted himself entirely to literary pursuits. He continued his series of Latin biographies already mentioned; he wrote also some Italian biographies; he edited the 'Giornale Pisano,' a literary magazine, which enjoyed considerable reputation in the latter part of the eighteenth century, and he published an interesting history of the University of Pisa: 'Historia Academiæ Pisanæ,' 3 vols. 4to., Pisa 1791. Fabbroni died at Pisa in 1803. A cenotaph was raised to his memory in the Campo Santo of that city. Fabbroni was considered one of the best Latin scholars and writers of Italy in the eighteenth century. His Italian works are: 'Elogj di alcuni illustri Italiani,' 2 vols. 8vo., Pisa, 1789; 'Elogj di Dante, di Poliziano, di Ariosto, e di Tasso,' 8vo., Parma, 1800; 'Dissertazione sulle Statue appartenenti alla Favola di Niobe,' Florence, 1799. He also contributed to the collection of 'Memorie de' più illustri Pisani,' 4 vols. 4to., Pisa, 1790.

(Lombardi, *Storia della Letteratura Italiana nel Secolo XVIII.*; Gamba, *Serie di Testi di Lingua*; *Life of Fabbroni*, written by himself, and inserted in the last volume of his 'Vitæ Italorum.'

FABA. [VICIEÆ, P. C.; BEAN, P. C.]

FABOI'DEA, Mr. Bowerbank's generic title for many seed-vessels in the London clay of Sheppey (*Fossil Fruits of the London Clay*).

FABRIA'NO, FRANCESCO DI GENTILE DA, commonly called Gentile da Fabriano, was born at Fabriano, in the Marc of Ancona, in the second half of the fourteenth century, about 1370. He was instructed by his father Niccolò in the physical and mathematical sciences, and was placed with Allegretto di Nuzio, called Gritto da Fabriano, to learn painting.

Gentile executed many works in fresco and a temperà at Gubbio and other cities of the Marc of Ancona; and also at Orvieto, Florence, and Siena. He painted in 1423 a Madonna for the Cathedral of Orvieto, and he is styled in the register of the cathedral—egregius magister magistrorum. He painted in the same year at Florence an admirable picture of the Adoration of the Kings, for the sacristy of Santa Trinità, which is now in the gallery of the academy at Florence, and is one of its choicest pieces. But his masterpiece, according to Vasari, was an altar-piece of the Virgin, &c., in the church of San Niccolò at the gate of San Miniato, painted in 1425, now lost, with the exception of two fragments still in the church. Gentile worked also with great distinction at Venice and at Rome: he was presented by the Senate of Venice with the patrician toga, and granted a pension for life, for a painting in the council chamber of the naval victory of the Venetians over the fleet of Frederic Barbarossa in 1177: it fell to pieces in the sixteenth century through damp. At Rome he painted some of the decorations of the church of San Giovanni in Laterano, ordered by Pope Martin V.; and a fresco of the Madonna and child with St. Benedict and St. Joseph, over the tomb of Cardinal Adimari, in the church of Santa Maria Nuova; all of which have now perished. It was the latter work which excited the admiration of Michael Angelo, and led him to say that his style was like his name—*Gentile*.

His colouring and execution were excellent for
and he was one of the most meritorious artists of
His works, though they were not to be compared
of Masaccio, or even of Fra Giovanni da Fiesole,
resemble, were an immense improvement upon
meagre forms of Giotto and his school. Gent
Jacopo Bellini at Venice, and that painter's son G
Fabriano's namesake. Gentile was also as super
theory of his art as its practice: he left writings on
and progress of art, on the mixing of colours, and
of drawing lines; but whether they still exist, do
pear. He died about 1450. There is some
Gentile in the *Memorie Storiche delle Arti e d*
della Marca di Ancona, by the Marquis A. Ricci,
1834; see also Vasari, *Vite de' Pittori*, &c.; and
to the German translation by Schorn.

FABROT, or FABROTUS, CHARLES-A
a jurist, was born at Aix in Provence, in 1580 or
the memoirs of the French jurists the names and
their patrons generally occupy an important positi
those who were instrumental in bringing Fabrot
occur the names of two distinguished men, Fabri
and Bignon, the avocat-general. With an interva
residence in Paris in 1617, Fabrot appears to have
in the University of Aix from the year 1609 to 163
went to Paris to print his edition of the Institut
philus, or the Greek version of Justinian's Institute
tionum Justiniani Imperatoris Paraphrasis Græca,
suit, et Scholiis Græcis auxit, Car. Annibal Fabrotus
got access to the MSS. in the possession of Cujac
others in the public libraries, he long laboured i
paration of an edition of the 'Basilica,' which
version of the several parts of the Corpus Juris, an
additions made under the Eastern emperors, w
through the fragments edited in Latin by Herve
to the jurists only in MS. Fabrot's edition wa
at Paris in 1647, in 7 volumes folio ('Basilic
Sexaginta, cum Versione Latina C. A. Fabrotti et
This edition contains thirty-three complete and
plete books of the sixty. [BASILICA, P. C.] In 1
edited at Paris the works of Cujacius, in 10 volum
well-known edition, but not well provided with m
ference. The labour connected with this work
have occasioned the death of its editor; he died
the 16th of January, 1759. He wrote several m
on jurisprudence, and some on the science now call
jurisprudence, e.g. 'Disquisitiones duæ: prior de J
—altera de Numero Puerperii.' Some of these m
are in the 'Thesaurus Juris Romani' of Everard O
'Biographie Universelle' attributes to him 'Les
de la Ville de Marseille,' translated from the Lati
mond de Solier, and published in 1615. Taisand
his memoir of Fabrot to Niceron, and the 'No
tionnaire Historique' and other ordinary French wo
ference appear to go to the same source.

(Niceron, *Mém. des Hommes Illustres*, xxix. 35

FACTORIALS. The subject treated under th
one which daily becomes of more importance in ma
analysis, and takes its rise at the commencement of

When we first begin to number, we easily make
sition from integers to fractions, because we are acc
consider ourselves as reckoning simple magnitude,
each unit can be divided into parts homogeneous
[NUMBER, P. C.] Be the unit what it may, in th
simple magnitude, it might as well have been any
what it is, so far as the possibility of conceiving and
arithmetical operations is concerned. But when w
count operations, not magnitudes, the case is muc
we can no longer say at pleasure that we can conc
troduce fractions. Certainly, as to additions, we
need not stop to learn what a fractional numbe
means. If, after having thought for a moment o
tions of 20 and seven additions of 20, we ask ours
ought to be meant by *six and a half* additions
imagine that it must necessarily mean six additions
lowed by an addition of 10. But this notion, th
most simple, and therefore adopted as a basis, is not

ist knows very well that having proved the equa- $)=x+mb$ to be true whenever m is an integer, he ved it to be true when m is a fraction: in fact, $+mb\cos 2m\pi$ would equally satisfy his demonstra- n infinite number of other solutions might be

come to reckon numbers of multiplications, we unity, and say, let a^n signify that unity is multi- s following by a. Now this symbol is, from the distinctly conceivable, whether a be integer or nder the usual and easy extension to fractions of multiplication; but it is not, or ought not to be, le when n is a fraction. What are four and a half ns by 36? The beginner will say, four multipli- 36, followed by a multiplication by 18: but this ining breaks down immediately, for the two half ould make more than the whole: two successive ns by 18 are equivalent to more than a multipli- 6. It is multiplication by 6 which is the *half-* multiplication by 36. It is true that we do not hrase *fraction of an operation* in our descriptive ut we apply the symbol in our symbols. For just n a^n denotes one multiplication by a, every $a^{\frac{1}{2}}$ de- ultiplication which twice repeated is equivalent to cation by a. In like manner $a^{\frac{1}{7}}$ is the multiplier g used 7 times, gives the same result as a used Ve are not going to give the theory of simple only to put it in connexion with what follows; der will do well to observe, that in the very first os [Addition of Ratios, P. C.] the notion of uantity entering as a multiplier in repeated opera- much in the minds of those who framed Euclid's at they spoke of what were really multiplications d been additions. The same thing may be traced 100 to 1 the duplicate ratio of that of 10 to 1 C.], and 10 to 1 the subduplicate ratio of that of duplicate means double, and subduplicate means beginner must learn to understand numbers with their force as indices of operation, and even the udent may require more study of this part of the he suspects himself of wanting.

establish the equation $\phi(x,m)=x^m$ when m is s not the same thing as establishing

$$\phi\left(x,\frac{m}{n}\right)=\sqrt[n]{x^m}:$$

ymbol $x^{\frac{m}{n}}$ in algebra is well known [Root, P. C.] complete meaning

$$\sqrt[n]{x^m}\left\{\cos\frac{m}{n}.2k\pi+\sqrt{-1}\sin\frac{m}{n}.2k\pi\right\}$$

ny integer.

r the operations of powers and roots, nothing occurs ntly in mathematical formulæ than successions of ns in which the multiplier is not always the same, $..n,\ a(a+b)(a+2b)\dots.(a+\overline{n-1}b)$. The va- which had been given of the interpolation of frac- ngs, such as that of Wallis [Wallis, P. C.], and ibnitz, the Bernoullis, Stirling, &c., have been ex- great power by the French and German mathe- the last eighty years. Two different lines were e two countries. The Germans first began to w the ordinary notation might be extended. de proposed to denote $m(m-1)(m-2)\dots.$ to $[m]^n$; the brackets distinguishing it from m^n in nse. Hindenburg, followed by Kramp and most ans, proposed a much better notation. Consider- enoting m unaltered factors, they made room in for a part expressive of the permanence of the wrote it $x^{m|0}$. Thus it became a particular case hich was made to stand for m factors, the first of and which alter by a at every step; giving

$$^{|a}=x(x+a)(x+2a)\dots\dots(x+\overline{m-1}a)$$

$$^{-a}=x(x-a)(x-2a)\dots\dots(x-\overline{m-1}a)$$

$$(x+\overline{m-1}a)^{m|-a}=x^{m|a}$$

$$1^{n|1}=1.2.3\dots\dots n=n^{n|-1},$$

This notation certainly opens the road to convenient expression of a large number of striking formulæ: take its binomial theorem for instance,

$$(x+y)^{n|a}=x^{n|a}+nx^{n-1|a}y^{1|a}+n\frac{n-1}{2}x^{n-2|a}y^{2|a}+\dots$$

which is perfectly analogous to the ordinary theorem.

Also the following:—

$$(1+A^{1|a}x+A^{2|a}\frac{x^2}{2}+A^{3|a}\frac{x^3}{2.3}+\dots)^m=$$

$$1+(mA)^{1|a}x+(mA)^{2|a}\frac{x^2}{2}+(mA)^{3|a}\frac{x^3}{2.3}+\dots\dots$$

which is true for all values of m, and gives the binomial theorem if $A=1$, $a=-1$, and the exponential theorem if $Ax=1$, $a=0$. The analogous theorem to Taylor's is

$$\phi(x+h)=\phi x+\frac{\Delta\phi x}{\Delta x}h^{1|-\Delta x}+\frac{\Delta^2\phi x}{\Delta x^2}\frac{h^{2|-\Delta x}}{1.2}+\dots.$$

which is well known.

We think it is to be regretted that this notation has not been more adopted in England: we do not remember at this moment any writer who has made much use of it, except Mr. Peter Nicholson, in his works on Involution and on Increments.

A name was to be found for this extension. The notion of calling x^2, x^3, x^4, &c. the *powers* of x, was an extension of the term as used by Euclid, which applied to the square on a line only. Not that the square on a line was originally called its power, but that the power of a line was measured by the capacity of its square. The object of the old geometers was to reduce every area to a square, which enabled them to describe it by one line; and hence a line seems to have been considered as having more or less power (of enclosing space) according as its square was greater or less: the power being measured by the magnitude of the square. The phraseology seems to have reached those who were not geometers: thus Diogenes Laertius tells us that Pythagoras discovered that* the 'subtending side of a right-angled triangle is as powerful as the two containing sides together.' But those who will smile at the idea of the power of a line residing in its square, will laugh outright at the notion of Kramp, who proposed, seeing x^n represents the *powers* of x, that the symbol $x^{n|a}$ should represent its *numerical faculties* (facultés numériques). From the powers and the faculties, we might have reached, possibly, the feelings and opinions, had it not been for Arbogast, who proposed to call the different cases of $x^{n|a}$ by the name of *factorials*, a term which has now gained considerable currency among the German writers, and was approved by Kramp himself.

The French, on the other hand, follow Euler and Legendre in connecting the factorials from the outset with definite integrals, and the latter in adopting a specific notation, not derived from that of powers. Legendre signifies $1\ .\ 2\ .\ 3\dots.n$ by $\Gamma(n+1)$, and hence the name of *gamma-functions* has been applied to them.

We shall give a slight account of the subject so far as it is in the way to be speedily reckoned among the elementary parts of mathematics.

A series or a product of n terms, is only distinctly conceivable when n is integer, but if it can be represented by a function in which n enters as a usual symbol of magnitude, and not as a number of terms or operations, then the function is intelligible, though not the representative of the series, when n is a fraction. To take a very simple case: it would be absurd to demand the value of $1+2+3+\dots\dots+(n-1)+n$, when n is a fraction; but this series is $\frac{1}{2}n(n+1)$, which is always intelligible.

The equation

$$1+2+3+\dots\dots+n=\tfrac{1}{2}n(n+1)$$

is absurd except when n is a positive integer. In the times when the phrase 'less than nothing' was invented, it would have been said boldly that $2\frac{1}{2}$ terms of this series are $\frac{1}{2}\times 2\frac{1}{2}\times 3\frac{1}{2}$, or $35\div 8$, and that -7 terms of it are $\frac{1}{2}(-7)(-6)$ or 21. All that we should now say is that the function which, when n is integer, is equal to $1+\dots..+n$ becomes $35\div 8$, and 21, when

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* We translate quite literally, to show that Laertius was not geometer enough to know that the subtending and containing was said of the *right angle*, not of the *triangle*. His words are ἴσον δύναται, which Kraus, who in his urn was not geometer enough to venture the rendering of ὀρθογώνιον into Latin, translates *tantundem valere*. We take Laertius as meaning that the hypothenuse was as powerful as the two sides together: whether he understood his own phrase, or only caught it from the geometers, is another question. For other uses of the same phrase, see Irrational, P. C.

n is $2\frac12$ and -7. Whether we are likely to be the gainers by refusing extensions of language which naturally present themselves, remains to be seen: it seems to us that '-7 terms of the series $1+2+...+n$' is a very innocent abbreviation of 'the value, when $n=-7$, of the function which, when n is an integer, is always equal to $1+2+...+n$.' But at any rate, mathematicians are now in the habit of passing from expressions in which n is an index of number of operations, to the equivalents in which n is only an index of magnitude, and of using the latter in the most general sense.

But there is an infinite number of ways of representing, for example, a function which is $1+2+....+n$ when n is an integer. If ϕn be a function which is unity whenever n is an integer, such as $\cos 2\pi n$, $1+\sin 2\pi n$, &c., then $\frac12 n(n+1)\times\phi n$ answers the condition as well as $\frac12 n(n+1)$. It is usual however to start with a radical function which is free from periodic multipliers, and there is generally no difficulty in deciding upon the selection. In all the cases which are most useful, the radical function is the one which is clear of all sines and cosines.

But it is to be remembered that in this branch of the subject we have not advanced so far as to make it coextensive with the theory of powers: it is in fact precisely in the condition of the theory of powers before the discovery of the multiplicity of values in x^n when n is fractional. We are thus limited to an arithmetical view of the subject. Some writers have censured Legendre for employing a new symbol $\Gamma(n+1)$, when $1^{n|1}$ was already in use: if, which may be doubtful, he had heard of the latter before he invented the former, he would, in our opinion, still have acted judiciously in inventing the additional symbol. He might have argued that it would not be wise to associate the second symbol with notions which are only true of the arithmetical case of it. As soon as the complete theory of the expression shall be given, $1^{n|1}$ is ready for it: in the mean while $\Gamma(n+1)$ expresses the arithmetical case of it, just as $\sqrt[n]{x^m}$ expresses that of $x^{\frac{m}{n}}$

The following are some of the cases, which are strictly intelligible when n is an integer, and in which the radical function remains intelligible when n is fractional:—

$$1+\tfrac12+\tfrac13+.....+\tfrac1n=\int_0^1\frac{1-v^n}{1-v}\,dv$$

$$1\times2\times3....\times n=\int_0^\infty \varepsilon^{-v}\,v^n dv$$

$$p\,(p+q)....(p+\overline{n-1}\,q)=q^n\frac{\int_0^\infty \varepsilon^{-v}\,v^{h+n-1}\,dv}{\int_0^\infty \varepsilon^{-v}\,v^{h-1}\,dv}$$

where $h=p\div q$.

The second equation, which may be thus written,

$$\Gamma(n)=\int_0^\infty \varepsilon^{-v}\,v^{n-1}\,dv$$

is the most important. The following are its principal properties:

1. Γn is finite when n is positive, but is infinite when n is 0 or negative. This draws a great distinction between it and $1^{n|1}$; for the general formula which connects factorials of positive and negative exponents, with a common augment, is

$$x^{-n|a}\times(x-na)^{n|a}=1$$

Γn, which is infinite when $n=0$, diminishes from thence very rapidly, becomes 1 when $n=1$, and thence further diminishes until $n=1{\cdot}461632...$, when it is least, being then $\cdot8856032....$ From thence it begins to increase, being 1 again when $n=2$, 1.2 when $n=3$, 1.2.3 when $n=4$, and so on.

2. The equation $\Gamma(n+1)=n\Gamma n$, so obviously true when n is an integer, is always true; giving also

$$\Gamma(n+1)=n\,(n-1)......(n-m)\,\Gamma(n-m)$$

for every integer value of m. Hence a table of values is sufficient which extends through one unit: and the most convenient interval is that from $n=1$ to $n=2$. If, for instance, we wanted to calculate from such a table the value of $\Gamma(5\frac12)$ we should reduce it to $4\frac12\times3\frac12\times2\frac12\times1\frac12\times\Gamma(1\frac12)$, and take $\Gamma(1\frac12)$ from the table. Similarly Γn, when n is less than unity, would be found from $\Gamma(1+n)\div n$. When n is very small, Γn is $1\div n$ nearly.

3. The labour of calculating the table is much lessened by the following equation:—

$$\Gamma n\times\Gamma(1-n)=\frac{\pi}{\sin n\pi}$$

which is true when n lies between 0 and 1. One
result of it is $\Gamma\frac12=\sqrt{\pi}$.

4. There is a constant to be introduced, which
call γ, the importance of which may in time co
that of π and ε. It is the limit of the expression
$3^{-1}+....+x^{-1}-\log x$, as x is increased without li
also the value of

$$\int_0^1\left\{\frac{1}{1-v}+\frac{1}{\log v}\right\}dv \text{ and of } -\int_0^\infty \varepsilon^{-v}\ \text{lo}$$

its value is

$$\gamma=\cdot57721566490153286060 65....$$

5. If S_n represent $1^{-n}+2^{-n}+3^{-n}+....$ ad infi
Summation, P. C., for some of the values; also 'I
Calculus,' *Library of Useful Knowledge*, p. 554)
rithm (Naperian) of Γx may be found in either of
ing ways:—

$$\log\Gamma(1+x)=-\gamma x\times\frac12 S_2\,x^2-\frac13 S_3\,x^3+\frac14 S_4$$

$$=\frac12\log\left(\frac{\pi x}{\sin\pi x}\right)-\frac12\log\left(\frac{1+x}{1-x}\right)$$

$$+(1-\gamma)x-\frac13(S_3-1)x^3-\frac15(S_5-1)x^5-$$

$$=\frac12\log(2\pi)+\left(x+\frac12\right)\log x$$

$$-x+\frac{1}{12x}-\frac{1}{360x^3}+....$$

6. A table of the values of comm. log. $\Gamma(1+x$
by Legendre, for every thousandth of a unit fr
to $x=\cdot999$: an abridgment of this table, with mea
pleting it, is in the 'Diff. Calc.' *L. U. K.* p.
function Γx is a fundamental mode of expressi
results of large classes of definite integrals. [I
Definite, P. C. S.]

7. The function $\Gamma(n+1)$ is the value, or one of
of $1^{n|1}$, and we have

$$p^{n|q}=q^n 1^{\frac{p}{q}+n-1|1}\div 1^{\frac{p}{q}-1|1}$$

$$=q^n\,\Gamma\left(\frac{p}{q}+n\right)\div\Gamma\left(\frac{p}{q}\right)$$

which holds whenever the second side is real and fi

The student who desires to know more of the t
consult Kramp's 'Analyse des Réfractions Astro
Strasburg, 1799, 4to., and the article 'Factoriell
Supplemental (or third) volume of Montferrier's
naire des Sciences Mathématiques,' Paris, 1840,
the article 'Facultat' in Grunert's Supplement t
'Worterbuch der Reinen Mathematik,' Leipzig, 18
8vo. On the form Γx see Legendre's well known
'Exercices du Calcul Integral,' and that on Elli
tions. Some of the substance of these is in the
the Differential Calculus, in *Library of Useful Kno*

FACTORIES. The word 'Factory' has, withi
few years, acquired a more definite and circumscri
ing than it before held. As a commercial term, it
the establishments for conducting trade in certain
colonial parts, such as the 'York Factory' of the
Bay Company in America, the 'English Factory'
and so forth. As a manufacturing term, it is appl
what vaguely to any manufactory or large worksh
industrial operations are carried on. But in a legislat
as defined by a recent statute, the word *Factory* i
mean 'all buildings and premises situated within a
the United Kingdom of Great Britain and Ireland
or within the close or curtilage of which steam, wat
other mechanical power shall be used to move or
machinery employed in preparing, manufacturing, or
or in any process incident to the manufacture of cott
hair, silk, flax, hemp, jute, or tow, either separately
together, or mixed with any other material, or a
made thereof.' It is in this limited sense that fact
be considered in the present article.

Legislative Provisions.—In the year 1833 a found
laid for the permanent supervision of cotton facto
others of a similar kind. There were, it is true, e
actments bearing on the subject. For instance, in
act was passed for the preservation of the health a

entices and others employed in cotton and other fac-
the act directed the local magistrates to report whether
ories were properly conducted, and to adopt such sana-
gulations as they might think fit. Another act, in
made various regulations as to the employment of
n in cotton factories. Others were passed in subse-
years; and in 1831 an act, commonly known as Sir
obhouse's Act, and applying to cotton factories alone,
d that no child could legally be employed in such
ry under 9 years of age; that no person under
s of age should be allowed to remain in the factory
han 12 hours a day; and that the working hours on
ys should not exceed 9 hours. But these enactments
mited to cotton factories; and there was no efficient
ery for enforcing their observance: the act was there-
pealed in 1833, consequent on the proceedings of a
ttee of the House of Commons in 1832, on the con-
of the persons working in factories.

act of 1833 (3 & 4 Wm. IV. c. 103) contains numerous
; but the chief matters that relate to the subject are
llowing:—1. After January 1, 1834, no person under
ars of age shall be allowed to work in the night,
, between a quarter past eight P.M. and half-past five
in any cotton or other factory in which steam or water,
y other mechanical power, is used to propel the ma-
y, except in lace factories. 2. No person under
all be employed more than 12 hours in one day, nor
than 69 in one week. 3. There shall be allowed in the
of every day not less than 1½ hours for meals to every
restricted to the performance of 12 hours' work. 4.
January 1, 1834, no child shall be employed under 9
of age, except in silk-mills. 5. After March 1, 1834,
ld, except in silk-mills, shall be employed in any factory
than 48 hours in any one week, nor more than 9
in any day, who shall not be 11 years old; nor after
1, 1835, who shall not be 12 years old; nor after
1, 1836, who shall not be 13 years old; and these
of work shall not be exceeded, even if the child has
d during the day in more factories than one. 6. Children
oung persons, whose hours of work are regulated, shall
titled to 2 holidays and 8 half-holidays in the year. 7.
ren, whose hours of work are restricted to 9 hours a day,
t to be employed without obtaining a certificate from
ician or surgeon, certifying that they are of the ordinary
th and appearance of children of the age before men-
, which certificate is to be countersigned by some in-
or justice. 8. The crown is to appoint, during plea-
our persons to be inspectors of factories, with extensive
as magistrates, to examine the children employed in
tories, and to inquire respecting their condition, em-
ent, and education; and one of the secretaries of state
have power, on the application of an inspector, to
superintendents to assist in carrying out the provisions
act. 9. The inspectors are to make all rules necessary
e execution of the act, and to enforce the attendance
ol, for at least two hours daily out of six days in the
of children employed in factories, from whose weekly
a deduction, not exceeding a penny in every shilling,
e made for the expense of schooling. 10. No child
e employed who shall not, on Monday of every week,
the factory master a certificate of his or her attendance
ool for the previous week. 11. The interior walls of
factory shall be whitewashed every year. 12. A copy
tract of the act shall be hung up in a conspicuous part
ery factory. 13. The inspectors shall regularly, once
r, report their proceedings to one of the secretaries of

There are other clauses regulating the hours of work-
where a water-wheel disturbs the uniformity of the
ng power; the steps to be taken in order to obtain
ar certificates of age for the children requiring them;
rection of schools, where necessary; and the mode of
ing the provisions of the act.

the following year a short explanatory act was passed, to
er more clear the meaning of the legislature on certain
s; but with this exception, no further change was made
st year (1844). Committees of the House of Commons
n 1840 and 41, and bills were from time to time intro-
d by individual members; but the Act of 1833 re-
ed the groundwork of all the proceedings in respect to
ries. The Act itself was in great part the result of a
mission which had been appointed in the early part of
, and which had collected information by means of dis-
commissioners in all the factory districts. This local machinery formed a groundwork for the inspectorship afterwards established by the government when the act was obtained. Four inspectors were appointed, and the British Islands were mapped out into four great divisions; the cotton and woollen district of Yorkshire, Lancashire, and the immediate neighbourhood, forming the 1st; the eastern and southern counties of England the 2nd; some parts of the West of England, nearly the whole of Wales, and the southern half of Ireland, constituting the 3rd; the northern half of Ireland, the whole of Scotland, and the four northern counties of England, the 4th. Each district was placed under one inspector, who made arrangements for becoming personally acquainted with every factory in his district employed for textile manufactures. Surgeons were appointed to grant the certificates required for the children; a system of occasional supervision was established; the inspectors communicated with the chief mill-owners on any points of difficulty which occurred; and the schooling of the children was gradually entered upon. One great difficulty however was this, that many manufactories, as a means of escaping from the provisions of the Act, gradually discharged the children who were within the specified ages, and employed others of an age to which the education and the working-hours clauses did not apply; and many young children were thrown out of employ in consequence.

The Act rendered imperative some sort of schooling for the factory children; but it did not lay down rules for its government. The arrangements accordingly became of a very crude and heterogeneous character. Mr. Saunders, one of the Factory inspectors, in his Report for 1843 (*Parl. Pap.* 1843, vol. xxvii. p. 355), states that the factory children receive their education from five different sorts of schools, which he classes as *Sunday Schools*, *Dame Schools*, *Factory Schools*, *Church Schools*, and *Dissenters' Schools.* The disposal of the children on Sundays is a matter which does not come under the control of the inspectors; but the four classes of week-day schools are those which affect the daily regulations of the factories. The dame-schools or private schools, kept by a master or mistress for their own profit, and not under the control or management of any other person, are of a very mean and inefficient kind, utterly wanting, in respect to instruction, books, and discipline, in the means of working out the required object. The factory-schools are such as are held in or near the factory where the children are employed, and are under the control and management of the owner of the factory. 'Some mill-occupiers have in a most praiseworthy manner spent large sums of money in school accommodation, and have taken great care in the selection of teachers. In these cases, particularly if the mill occupier continues to interest himself in the management of the school, such a factory-school will be as efficient as any other school conducted on the same principle. Some of the schools are supported wholly at the expense of the factory master. Other masters guarantee the payment of all expenses, but require each child to pay a weekly school-fee.' (p. 356.) The Church Schools and the Dissenters' Schools, supported in many cases by powerful religious denominations, partake of the general character of such classes of schools, in respect to education and discipline.

Mr. Saunders remarks that the efficiency of the education depends not so much on whether the school be of one or other of the above four classes, as on the mode in which it is conducted. Many of the factory-schools, where the owner cares very little about the matter, are as bad as the dame-schools. In one factory the schoolmaster was an overlooker, who had to attend both to spindles and to scholars. In another he was a cotton-warp winder. In a third he was an old disabled soldier. Every week (as before stated) each child has to bring to the factory a certificate of attendance at school; and Mr. Saunders gives fac-similes of four of these certificates, to show the efficiency of the teachers who wrote them. They run thus:—'I do hereby certfy that my scholors have attend 2 hours every day durang the last week, May 2, 1843.' 'Hi do her testify that these children Have tended the school too hours during last whek, May 2, 1843.' 'These children have attended My school 2 howers every day last week, May the 2, 1843.' 'This is to certify that these children attends regular the school six days a week, two hours a day. May the 2, 1843.' (p. 379.) These, as may be supposed, are the most unfavourable examples. In many cases the mill-owners take great interest and expend considerable sums in giving efficiency to the schools. At Messrs. Marshall's, at Leeds, for instance, there is near the factory a neat red building erected purposely as a school-room for the factory children. 'It contains, besides private apartments for the master and mistress, a boys' school, measuring eighty feet by thirty-six, a girls' school nearly as large, and a class-room for lectures, &c. between the two. One of the rooms contains an organ. In the boys' school there are benches arranged on the class or monitorial system, each bench having a kind of shelf beneath it, on which the boys place their caps, and a monitor's seat, which is also a box for containing books. Although intended principally for the factory children, yet these schools are open to all the children in the neighbourhood whose parents choose to adopt the regulations laid down for its good governance. In the operation of the Factories Act, all the children in a factory are bound to attend school for a certain period each day; those who work in the forenoon must attend school in the afternoon; those who work in the afternoon are at school in the forenoon. Hence there is a distinction in the schools belonging to Messrs. Marshall between the "half-time hands" and the other scholars; the former being those engaged in the factory, and under the influence of the Factories Act, and the latter being other children living in the neighbourhood. Altogether there are about three hundred and fifty boys, and a hundred and eighty girls, who are under the care of a master and mistress engaged expressly for the school. The school-rooms are comfortably warmed by hot-water apparatus, and there is a large plot of ground outside the building which serves as a play-ground.' ('Penny Magazine,' No. 754.)

In 1844 an act was passed (7 & 8 Vict. c. 15) which came into operation in October of the same year, and effected certain changes in the law as to factories. An 'Office of Factory Inspectors' is to be established in London. Persons beginning to occupy a factory must send notice of it to this office. The powers of inspectors to enter factories and schools is increased. The certifying surgeons are to be appointed by the inspectors; and the certificates are to have a definite form and expression. The whitewashing or painting of a factory is placed under strict regulations. Provision is made for the protection of children from the effects of the water in 'wet-flax spinning,' and from accidents by the machinery while in motion. Children may be admitted and employed at eight years of age (the former minimum having been nine years). The maximum amount of daily work for each child is seven hours, subject to diminution in certain cases. All females are regarded in the same light as 'young persons' (i. e. from thirteen to eighteen years of age), in respect to the limitation of the hours of work. The recovery of lost time by the stoppage of machinery, the regulation of the meal-times in the factories, the holidays given to the children, the control of their attendance at school, the inspection of dangerous machinery, and many other points, are modified or extended in this act; which however preserves the general character of the act of 1833.

Statistical Details.—One result of the act just alluded to, viz. that of 1833, has been a more intimate knowledge of the statistics of factory operations than would otherwise have been obtainable.

The number of power-looms employed is, to a certain degree, an index to the extent of factory operations; since the substitution of a power-loom for a hand-loom involves the substitution of a large and well-organized factory for, perhaps, the humble cottage of the hand-loom weaver. In a return made to government, two or three years after the appointment of the factory inspectors (*Parl. Pap.*, 1836, vol. xlv. p. 14), the number of power-looms then employed is stated to have been—

	Cotton.	Wool.	Silk.	Linen.
In and near Manchester .	47,039	758	360	0
Clothing District of Yorkshire .	3,114	3,128	0	0
Cheshire and Derbyshire .	18,849	432	0	0
Scotland . . .	17,531	22	0	168

together with a small number scattered in other districts.

The same volume (p. 51) gives a return of the number of factories, and of the persons working therein, in 1836. For brevity we will call the four districts, into which the kingdom is divided in respect to factory inspectorship, the East Anglian, the West Anglian, the North Anglian, and the Scotch.

	Cotton.		Wool.		Silk.		Flax.	
	Mills.	Persons.	Mills.	Persons.	Mills.	Persons.	Mills.	Persons.
East Anglian District	69	8,613	106	4,102	76	10,099	48	1,489
West Anglian ,,	11	1,548	355	16,439	26	1,510	5	1,003
North Anglian ,,	817	134,936	717	46,643	30	6,538	77	11,284
Scotch ,,	190	36,945	114	4,129	6	686	211	18,024

By the commencement of 1839 (*Parl. Pap.* xlii.) the numbers had thus risen:—

	Cotton.		Wool.		Silk.	
	Mills.	Persons.	Mills.	Persons.	Mills.	Per
East Anglian District	202	20,833	943	55,462	71	10,5
West Anglian ,,	199	39,304	416	15,761	162	17,4
North Anglian ,,	1,202	159,050	236	8,916	30	5,4
Scotch ,,	216	40,198	143	6,307	5	7

Another return (*Parl. Pap.* 1843, vol. lvi. p.
series of numbers under three different points o
first being classed according to the kind of text
the second, according to the location in different
empire; and the third, according to the ages and
workpeople.

	No. of Factories.	Horse-power employed.
Cotton . . .	1,819	55,785½
Wool . . .	1,788	15,564½
Silk . . .	268	2,977
Flax . . .	392	9,585
Total . .	4,217	93,912
England . .	3,475	77,804½
Scotland . .	492	12,448½
Ireland . .	95	3,001
Wales . . .	155	657½
Total . .	4,217	93,911½

Males under 21	100,65
Males 21 and above . . .	77,99
Females under 21 . . .	163,25
Females 21 and above . .	81,56
Total	423,47

There are one or two trifling discrepancies in t
not explained in the Report. It may be well to
these numbers relate to the workpeople actual
within the factories at one or other of the above
textile manufacture. The whole number who
by the clothing arts, including those engaged i
weaving, stocking-making, calico-printing, dyein
&c., very greatly exceeds the above, and has b
estimated by different writers.

In a work published in 1840 ('Cotton Manuf
United States,' by James Montgomery) a compar
between certain features of the factory-system
in America and in England:—'In every departm
of wages is generally higher in the United States
tain; nor do I think that they will for many years
this country as in Great Britain. The price of li
higher, and the hours of labour longer; besides,
part of the factory workers being connected wi
whenever wages become reduced so low as to cease
an inducement to prefer factory labour above any ot
they can turn their attention, then a great many f
have to shut up. During a stagnation of trade, i
for the manufacturers here to stop a part or the w
factories, and then the workers retire to their
was the case in 1837, when a vast number of fa
entirely shut up. Yet it seemed not to affect the
materially: indeed, many of the girls who had bee
in a factory seemed to rejoice and to regard it
recreation' (p. 137). Factories may be shut up
or work half-time, but the workers do not turn
again to agricultural pursuits. The whole tenor
dence collected by the Commissioners and Inspe
to show, that however low factory wages may be
rarely indeed that any of the workers turn to fa
ment.

Although it was so late as 1790 that the cotto
ture was established in the United States, there we
in full operation 801 factories; containing 33,433
1,246,703 spindles; employing 18,590 adult ma
adult females, and 4691 children; and consuming
pounds of cotton yearly.

The factories at Lowell in Massachusetts exem
than any others the rapid progress of factory labour i
The territory of Lowell, comprising an area of
miles, was until the year 1819 a barren spot, bu
with good water-power. Mr. Boot, a wealthy B
chant, discovered its resources, and established
for turning them to account. This was follow

of other companies, by whom the textile manu-
s carried on with great energy. A period of
rs raised the district from almost a wild state to
ı of a flourishing seat of manufacture, possessing a
of twenty thousand inhabitants. In 1839 there
owell 29 factories, exclusive of print-works and
; 163,404 spindles; 5094 looms; consuming
,300 pounds of cotton; and dyeing and printing
rds of woven goods per week.

e Sixth Decennial Census of the United States,
40, the following information was obtained respect-
tile factories manufactures:—

.—Number of fulling-mills, 2585; woollen factories,
e of manufactured goods, 20,696,999 dollars; per-
yed, 21,342; capital invested, 15,765,124 dollars.

—Number of factories, 1240; number of spindles,
dye-works and print-works, 129; value of goods,
dollars; persons employed, 72,119; capital in-
102,359 dollars.

umber of pounds, reeled, thrown, or made, 15,745;
ods, 119,814 dollars; males employed, 246; fe-
children, 521; capital invested, 274,374 dollars.

Value of goods, 322,205 dollars; persons employed,
tal invested, 208,087 dollars.

abrics.—Value of goods, 6,545,503 dollars; per-
yed, 15,905; capital invested, 4,368,991 dollars.

istical returns made to parliament respecting manu-
the Continent, though full of valuable information,
complete enough to furnish a classified list of tex-
s, in the limited sense employed in this article.

YRUM, a genus of plants belonging to the na-
Polygoneæ. It has a 5-parted perianth, 8 sta-
yles, a 1-seeded trigonous nut, a central embryo,
foliaceous, contorto-plicate cotyledons. There is
itish species of this plant, the *F. esculentum*. This
onum Fagopyrum of Smith, and known as the com-
Wheat. It has an erect stem without prickles, the
ymose panicles, 8 stamens, leaves cordate, sagittate
uetrous acute nut with entire angles. This is a valu-
as it grows on the worst and poorest soils, and is
as food for game. Though now admitted into the
ra, there can be no doubt that it was originally a na-
ia and other Asiatic countries. It was introduced into
the Crusaders; and hence in many parts of France,
commonly grown, is called Saracen Corn; and so
esteemed in Belgium, that M. Bory St. Vincent
shown the tomb of the person who is reported to
rought it into that country. [Buck-Wheat, P. C.]
on, *Manual of British Botany*; Burnett, *Outlines*
)

NHEIT, GABRIEL DANIEL, an able ex-
in natural philosophy, was born at Danzig near
the seventeenth century, but the precise year of
unknown. His father intended that he should
mercantile occupation, but his own taste inclining
scientific pursuits, he used every opportunity of
himself in such physical researches as his circum-
mitted.

travelled through different parts of Germany in
equire information respecting the subjects of his
came to Holland, and established himself at Am-
a maker of philosophical instruments.

iderably improved the aræometer [Aræometer,
but he is chiefly distinguished for the invention
rticular scale which he applied to thermometers
eter, P. C.], and has ever since been generally
is country. The fluid which he employed in the
of the thermometer was mercury; and to the
d of a globular, he gave a cylindrical form. The
were generally executed on paper which was
out and made to adhere to the tube, and the in-
as contained in a glass cylinder.

eit was elected a Fellow of the Royal Society of
1724; and in the 'Philosophical Transactions' for
re papers by him on the heat of liquids in a state
, on the freezing of water in vacuo; on the spe-
es of certain bodies; also on an improved baro-
aræometer. He contrived a machine which he
be used for the purpose of draining marshes; but
rhich took place in 1740, prevented him from com-

ORNE, WILLIAM. This distinguished English
the time of Charles I. was born in London, but in what year is not known. He was instructed by Mr., afterwards Sir Robert Peake, painter and printseller, with whom he worked three or four years before the breaking out of the rebellion; and when Sir Robert Peake was made Lieutenant-Colonel, and intrusted with a command in Basing-House, Faithorne enlisted under him, and they were both taken prisoners together. Faithorne was brought to London and confined in Aldersgate, where he resumed the graver; he was however shortly afterwards released and permitted to go to France. He returned about 1650, and opened a print-shop in the Strand, near Temple Bar, and prosecuted his art at the same time. About 1680 he gave up this shop, removed to Printing-House Yard, Blackfriars, and in addition to engraving pursued portrait-painting in crayons. He died in 1691, and was buried in St. Anne's, Blackfriars.

In 1662 Faithorne published a treatise on engraving, dedicated to Sir Robert Peake, entitled 'The Art of Graveing and Etching, wherein is expressed the true way of Graveing in Copper. Also the manner and method of that famous Callot, and M. Bosse, in their several ways of Etching.'

Walpole has given a considerable list of Faithorne's prints, of which the following are some of the best:—His own Head looking over his shoulder, with long hair; Sir William Paston, Bart., 1659, which Walpole terms his most perfect work; Lady Paston, same date, probably after Vandyck; Margaret Smith, widow, wife of Sir Edward Herbert, after Vandyck; Montagu Bertie, second Earl of Lindsey, after Vandyck; Sanderson, 1658, prefixed to his *Graphice*, after Zoust; Anne Bridges, Countess of Exeter, after Vandyck; Thomas Hobbes, ætat. seventy-six; Henrietta Maria, with a veil, executed in Paris; a large full-length emblematical print of Cromwell, in armour; Queen Catherine, in the dress in which she arrived in England; Barbara, Countess of Castlemaine; Prince Rupert, after Dobson; Dr. Harvey, bust on a pedestal; Sir Thomas Fairfax, after Walker; John Milton, ætat. sixty-two, drawn by Faithorne himself, &c., &c.; and four illustrations to Taylor's 'Life of Christ,' the Last Supper, Christ Praying in the Garden, the Scourging, and the Marriage of Cana. His works were chiefly portraits. His son William, called William Faithorne the Younger, engraved portraits in mezzotint, but he was of dissipated habits, and he died towards the close of the seventeenth century, aged about thirty. There are heads by him of Mary, Princess of Orange, Queen Anne, Prince George of Denmark, Charles XII. of Sweden, Dryden, &c. (Walpole, *Catalogue of Engravers*, &c.)

FALCONET, ETIENNE MORICE, a sculptor of considerable, but transient, reputation, was born of poor parents at Vevay in Switzerland, in 1716. He studied several years under Lemoine, and first made himself known by a group of Milo destroyed by the Lion, for which he was elected a member of the French Academy of Painting and Sculpture in 1745, and of which he was subsequently made a professor, and eventually rector.

In 1766 Falconet was invited by Catherine II. to St. Petersburg; and here he executed his most celebrated work, the colossal equestrian statue of Peter the Great, which is fixed on a large piece of rock, on the place in front of St. Isaac's Church; it occupied him three years. He returned to Paris in 1778, and died there in 1791. Falconet wrote several theoretical works upon the arts, as 'Reflexions sur la Sculpture,' &c., which appeared originally separately, but were published together at Lausanne, in 6 vols. 8vo. in 1782, and at Paris in 3 vols. 8vo. a few years afterwards. He was a zealous critic, and frequently very warm in the expression of his opinions, especially his censures. But in his own practice he was mannered. His works display little of the proportions or character of the antique. He never was in Italy.

(*Biographie Universelle.*)

FALKLAND, LUCIUS CARY, VISCOUNT, was the eldest son of Henry Cary, Viscount Falkland [Falkland, Henry Cary, Viscount, P. C.], and was born in 1610. His father was Lord-Deputy of Ireland from 1622 till 1629, and during this time he was educated at Trinity College, Dublin, but afterwards at St. John's College, Cambridge. Before he was of age he inherited an ample fortune from his grandfather, and soon afterwards went over to the Netherlands, with the intention of taking a command, but finding the campaign inactive, he returned to England. Having conceived a desire to be able to read accurately the Greek authors, he secluded himself at his seat near Burford in Oxfordshire, and prosecuted his design with such vigorous industry that he became a master of the language in an incredibly short time. His house was only about ten miles from Oxford, and Chillingworth and other learned men of the University were at this time in the habit not only of visiting him, but of residing with him. In 1639 he joined the expedition against the Scotch. His peerage, being Scotch, did not entitle him to sit in the House of Lords, and in 1640 he was elected member for Newport, Isle of Wight, in the parliament which assembled on the 13th of April, and was again elected for the same borough in the parliament which met on the 3rd of November in the same year.

Lord Falkland was free from any party bias, and thinking that the leaders of the popular party were in certain instances pushing their measures to an extent which was illegal and fraught with danger, he opposed them strenuously: hence he came to be regarded as an advocate of the court, and Charles I. invited him to become one of his privy council, and offered to make him secretary of state in the room of Sir Henry Vane, whom the king had dismissed. Lord Falkland was much disinclined to associate himself with the court party, but after much persuasion by Lord Clarendon and other personal friends, he was prevailed upon to accept the king's offers. His severity of moral principle was ill fitted to harmonise with Charles's duplicity and unconstitutional designs, but the civil war having commenced, he adhered to him with inflexible firmness, using every effort to reconcile the contending powers, and, though without any military command, attending the king on all occasions of conflict or danger. But his alacrity of spirit had deserted him, and when sitting among his friends, after long silence and frequent sighs, he would ejaculate, 'Peace, Peace,' in a mournful tone, and passionately profess that 'the very agony of the war, and the view of the calamities and desolation the kingdom did and must endure, took his sleep from him, and would shortly break his heart.' He insisted on making one in the first rank of Lord Byron's cavalry at the battle of Newbury, September 20, 1643, and on the first encounter was shot in the belly with a musket-ball; he instantly fell from his horse, and his body was not found till the following day.

Lord Clarendon, who was his intimate friend, has pronounced a long and eloquent eulogium on his character, which indeed appears to have been worthy of the highest admiration. His chief work was 'A Discourse on the Infallibility of the Church of Rome,' which Swift, in his 'Letter to a Young Clergyman,' praises for its purity and simplicity of style.

(*Biographia Britannica*; Clarendon's *History of the Rebellion*, book vii.)

FALKLAND ISLANDS. Since the article FALKLAND ISLANDS was published in the P. C., much new information about them has been obtained, and these islands have been made a British colony. They are situated between 51° and 53° S. lat. and between 57° and 62° W. long., and form a group of islands in the Southern Atlantic, consisting of two principal islands, East and West Falkland, with a considerable number of smaller islands clustered around them and in the straits between them. East Falkland is about 90 miles long, and on an average 40 miles wide; West Falkland is about 80 miles long with a mean width of about 25 miles. The smaller islands, about two hundred in number, vary considerably, from sixteen miles in length and eight in width to mere islets of half a mile in diameter. East Falkland is computed to contain 3000 square miles; West Falkland is estimated at 2000 square miles. If the adjacent islands are added, the whole group may be estimated to contain about 6000 square miles, or nearly two hundred more than Yorkshire.

Tides and currents.—The rise of tide is about four feet at neap and eight feet at spring tides. The principal swell comes from the south-east. Scarcely any tidal current is perceptible on the south-east coast of East Falkland. But along the south, east, and west shores it increases in strength, until among the Jason Islands it runs six miles an hour, and causes heavy and dangerous races. The tide flows from both openings into Falkland Sound, or the Straits separating East and West Falkland, and meets near the Swan Islands.

There is a perpetual current setting past the group from south-west to north-east, which continually brings drift-wood to its southern shores. On all parts of the southern shores that are open to the south-west, the beaches or rocks are covered with trees, which have drifted from Staten Land or Tierra del Fuego. This current continues to a distance of two hundred miles to the north-eastward of Berkeley Sound, as is indicated by great quantities of drift-kelp, water-worn trunks, and branches of trees, which are carried so far. But this current never runs more than two knots an hour, and in all probability its usual rate is even less than one knot.

Coasts.—The whole group is deeply indented
bays, harbours, creeks and inlets. Perhaps the
country in the world which exhibits such an irregular
and is so full of harbours and creeks. On Wes
and some small islands near it, there are high
cliffs in a few places exposed to the western seas
places, and especially the southern portions of Eas
are so low that they cannot be seen from the deck
five miles distant.

Surface and soil.—We know very little of Wes
Fitzroy states that the average height of it is great
of East Falkland, though the highest hills seem t
last-mentioned island, with which we have become
acquainted within the last twenty years. A ch
hills, called the Wickham Heights, runs across it i
and west direction from Port William to Port Suss
land Sound. Many of them rise to the elevation of
as Mount Usborne, near Port Sussex, which is 230
the sea level; the other hills vary in height from
feet. They consist of stratified quartz rock, w
tremely rugged at the summits, where it sometin
the most wild and fantastic forms. The summit
in points or ridges, are seldom rounded, and never
The country north of the Wickham Heights
surface, and at several places these hills rise to so
feet above the general level. That portion of
which lies south of the Wickham Hills may be c
a level plain, gently declining towards the sout
This plain is traversed by a number of wide and
pressions running from the base of the mountains
They are frequently a mile and more wide, an
between them rise on an average fifty or sixty feet
bottoms. Thus the country exhibits an undula
Governor Moody says that this is the best tract o
he has seen in the Falkland Islands.

In some parts of the island the bottoms of the
covered by great angular fragments of quartz r
blocks vary in size from that of a man's chest to te
times as large, and occasionally they are still lar
do not occur in irregular piles, but are spread
sheets or great streams. These streams of stone
a hundred feet to a mile in width. The bottom
about ten miles from Port Louis is entirely cover
stones, an area of about three miles and a half by

A view of the country from one of the heights i
deed. Moorland and black bog extend as far as e
cern, intersected by numerous streams and pools
brown water. On that account the earlier voy
spoken with contempt of these islands; but when it
that the cattle which had been left there by the
settlers had not only increased in number, but also
was supposed that the soil must possess a consider
of fertility. The most general description of soil i
fine dark, almost black, peaty quality, compact, and
inches to two feet in depth, lying upon a subsoil
velly clay where the underlying rocks consist of
On the hills the subsoil is chiefly a stiff dirty
The last-mentioned districts are wet and swampy.
coarse wiry grasses and mosses. Where the sub
of gravelly clay, the land is much drier, the soil m
and the grasses of good quality, although even these
tain many spots of swampy land and peat-bogs a
depth, arising from springs and rivulets which do
ready escape. About one-fourth of the island has
soil, which produces a few grasses, but chiefly heat
shrubs. In all cases, where the peaty soil has beco
with the subsoil, as in the bottoms of many of the
the sides of the streams, and almost always at the
the streams, the soil is of the richest quality and
remarkably thick and verdant. This kind of s
south of the Wickham Heights.

Rivers and Lakes.—There are few rivers. The S
the largest. It winds very much, and is only a
miles in length, and navigable for boats about eight
its mouth. There is, however, a great number of
rivulets, and also many fresh-water lakes or ponds,
size from thirty yards to three or four miles in circ

Climate.—The climate resembles that of Engl
still more equable; the summers are not so ho
winters not so cold. The thermometer ranges in g
tween 30° and 50° in winter, and between 45° a
summer; sometimes, but rarely, it rises to 80°, and d
25° or even 20°. There is little snow or ice in wi

seldom exceeds half an inch in thickness, and the snow is y more than ankle-deep, and remains a very short time the lower lands. There is very little foggy weather. Thunder and lightning are extremely rare. Light passing ers are frequent, but a day of constant rain seldom hap- . The total amount of rain which falls in the year is ibly less than in England, and certainly not more.

he prevalent direction of the wind is westerly, shifting een north-west and south-west. Easterly winds are very Northerly winds are more frequent, and they bring y wet weather. Hard gales blow from between south- and south-west, but they rarely last more than twenty- hours. The westerly winds commonly commence at nine ck, blow with a force frequently bordering on a gale gh the day, and die away about four or five in the after- . The nights are generally calm, and the contrast of the t, still, early mornings and calm evenings with the y mid-day is very great and striking. Gales and y weather are much more frequent in summer than in r.

ductions.—There are no trees in these islands; but it is ht that some of those which grow in Tierra del Fuego succeed here, if properly managed. There are, how- three different kinds of bushes which are used as fuel. he numerous peat moors yield a fuel of a dark black , which is of excellent quality. The grasses, which ent must be considered as constituting the most im- production of the group, are long and apparently , but they possess very nourishing qualities. One of called *tussac*, has especially attracted the attention of lists and graziers. It is a gigantic sedgy grass of the *Carex*, whose blades generally measure seven feet in and three-quarters of an inch in width. It covers great mosses, and grows on the worst soil, but in its state is only found near the sea, and it hardly ever more than half a mile from the beach. Another of very nutritious quality, the *arundo alopecurus*, is abundant and universally distributed over the whole y. Of other natural vegetable productions useful to find mentioned the balsam bog (*Bolax glebaria*), the lery (*Apium graveolens*), the tea plant (*Myrtus num-*), whose leaves are used as a substitute for the Chinese the little cress (*Cardamine glacialis*), the scurvy-grass *emuphylla*), and the native spinach, a species of x.

attempts to introduce our vegetables have generally ed: turnips, cabbages of all sorts, lettuces, radishes, potatoes grow to perfection, and it is thought that with attention, cultivation, and good seed, all the common productions would succeed. It is still doubtful if especially wheat, will grow. It has been proved that ill grow well, but hemp has not been tried.

igenous animals are not numerous. The only quadru- the warrah or wolf-fox, a peculiar species confined to chipelago. It is about the size of an English hound, ender, with long legs. Rats and mice had unintention- been introduced by the Europeans. The other animals are found in a wild state have been brought there he intention of being left, or remained there when the pean settlements were broken up. The most important wild cattle, which are met with everywhere: the in East Falkland is stated to amount to 30,000 though large numbers have been killed by the crews ling-vessels, or others which have resorted to the harbours of the islands. The animals appear to be equal in size to the best English breeds. Wild horses y found on East Falkland, north of Wickham Heights. are of a small breed, about 14 hands high, and in gene- y animals. Sheep thrive admirably in these islands; number is stated to be about three thousand. Wild are only found on some of the smaller islands. Rabbits d in incredible numbers at several places, and their are exported.

d fowl is abundant,—two kinds of wild swans, three of geese, four or five kinds of ducks, two kinds of snipe, , shags, penguins, rock-hoppers, sand-pipers, gulls, Cape- , white-birds, albatrosses, owls, a large kind of carrion- and rooks, with some other smaller species.

air and fur seals, which were formerly so abundant about islands, have considerably decreased in number. Black es are still numerous in the sea west of West Falkland, re many American and French vessels are employed in ing them, and appear sometimes even in Berkeley Sound. The supply of fish is abundant, but there is no great variety. The most common are a kind of mullet and the smelt; the former attains a large size. There are no frogs or reptiles of any kind, and only a few flies and spiders.

Bituminous coal, fit for a variety of purposes, is found on Sussex Harbour, East Falkland; and excellent peat occurs almost everywhere.

History and Settlement.—It must remain doubtful if Amerigo Vespucci, on his third voyage, which by Humboldt has been identified with that of Pedro Alvarez Cabral, had seen the Falkland Islands. The latitude given by Vespucci agrees pretty well, but the description of the country is so much at variance with the physical geography of the group that it has suggested to Captain Fitzroy the idea that Vespucci must have seen New Georgia. We know with certainty that these islands were seen in 1592 by Dr. John Davis, who accompanied Cavendish in his second voyage; and Hawkins, who sailed along them in 1594, called them Hawkins's Maiden Land. In 1690 Strong sailed through the channel which separates East and West Falkland, and called it Falkland Sound, which name afterwards was transferred to the whole archipelago. Several vessels from St. Malo passed near the islands between 1706 and 1714, and from these they were named by the French, Isles Malouines. In 1764 the French, under the auspices of the famous navigator Bougainville, established a colony on one of the harbours of Berkeley Sound on East Falkland, and called it St. Louis; and two years later the British formed a settlement on West Falkland, under Captain Macbride, on the inlet, called Port Egmont. Soon afterwards the French, in 1767, ceded their settlement, from political motives, to the Spaniards, who in 1770 attacked the English colony with a superior force and took it. After some negotiations, which nearly led to a rupture between the two countries, Port Egmont was restored to the English. But as the place for the colony had not been well chosen, and none of the advantages which had been expected from its establishment resulted to the nation and its commerce, the British abandoned the colony, but did not give up the rights of possession. The Spaniards also withdrew their garrison from Port Louis, but the precise time at which it took place is not known; probably it was in the beginning of this century.

In the beginning of this century, the whale fishery in the Southern Atlantic began to be prosecuted on an extensive scale by some European nations and the North Americans. Most of these vessels visited the Falkland Islands, especially to kill wild cattle and refresh their crews. They soon discovered that the islands were visited by a great number of hair and fur seals, and these animals attracted a considerable number of other adventurers. Thus some persons were almost always found on Berkeley Sound. This induced the government of the newly established republic of Buenos Ayres to take possession of the island in 1820. England protested against this step in 1829. Meanwhile the government of Buenos Ayres had formed a settlement at Port Louis in 1823, but Great Britain asserted its rights, and the colony was given up to the English in 1833. For some years only a lieutenant of the navy with a boat's crew resided at Port Louis, but as it appeared that this force was unable to keep in order the numerous crews of the whaling and sealing vessels which resorted to the island, the British government resolved in 1840 to colonize this group, and to send there a governor and a small force. They settled at the old establishment in Port Louis; but on examining the country in its vicinity, it was found that Port William, south of Berkeley Sound, offered greater advantages as a naval station and port of refuge, and in 1844 Governor Moody laid out a town on the southern shores of Stanley Harbour, a land-locked inlet, sheltered from every wind. The settlement at Port Louis, called Anson, however is also to be preserved.

(Weddell's *Voyage towards the South Pole;* Fitz-Roy and Darwin, in *Narrative of the Surveying Voyages of the Adventure and Beagle;* and Reports of the Colonial Land and Emigration Commissioners in 1843, 1844, and 1845.)

FALSE IMPRISONMENT is an unlawful arresting or imprisoning, either without just cause or without proper legal process. In whatever manner the unlawful detention arises, it is false imprisonment, for which an action in damages lies. Where there is a colour of authority, the usual form of the action for false imprisonment is an action 'on the case;' in other cases the form of the action is that of 'trespass.'

When erroneous process issues out of a court having jurisdiction in the matter, a bailiff or officer who arrests a party in execution of it may excuse himself in an action for false imprisonment by showing that the court had jurisdiction; but if the court out of which the process issues has no proper cognizance of the cause, then, as the whole proceedings are *coram non judice*, the officer will be liable.

If an arrest be made by one who is not a legal officer, or who has not at the time a warrant, or is not named in it, it is a false imprisonment, for which an action lies. If a sheriff or his bailiff arrest a man out of his county, or upon a warrant of a justice whose commission has expired, or arrests the wrong party, he is liable.

Mere irregularities in lawful process may constitute false imprisonment, and the judges will discharge the party upon condition of his waiving his right of action.

All persons concerned in a wrongful imprisonment are liable in an action of false imprisonment, and the party aggrieved may sue any one of them. Thus, if the plaintiff in a suit brings an unlawful warrant to the sheriff, or if he bring a good warrant, but direct the sheriff to the wrong man, the action will lie against both.

FAMILIES OF PLANTS. The word family in botany is mostly applied to a group of plants of the same value as a natural order. In this sense it has been mostly employed throughout the pages of this work. At the same time, in the arrangements of some writers, a family is made a group of less value than an order; whilst in the writings of others the term is loosely applied to distinguish any group of plants of higher value than a single species. It is thus sometimes employed synonymously with genus. The names of natural orders being mostly those of a genus, which serves as a type for the rest of the group, are easily Englished by adding the word family. Thus the order Gentianaceæ is called in English the Gentian family, and so on. By this means the word family is sometimes restricted to the species of a genus. Another word used synonymously with natural order by Dr. Lindley is tribe. In his natural system, all the orders having typical genera with English names have been called tribes, with the English names attached. Thus, Cinchonaceæ, the Coffee tribe; Pistiaceæ, the Duck-weed tribe; Euphorbiaceæ, the Euphorbium tribe. At the same time tribe is frequently used to express a group of less value than an order, as in the larger orders, Umbelliferæ, Leguminosæ, Compositæ, Cruciferæ, &c. The following plan will give an idea of the relative value of terms used in the subdivisions of plants:—

CLASS.
SUBCLASS.
Group.
Alliance.
Order.
Suborder.
Tribe.
Subtribe.
Division.
Subdivision.
Genus.
Subgenus or Section.
Species.
Variety.

The divisions, groups, and alliances between the subclass and order are adopted by Lindley in his natural system, and frequently occur in this work. It is only a few orders, such as Compositæ, that require the subordinate divisions above, and only the larger genera require to be divided into subgenera.

FAN, an instrument or machine for agitating the air by the wafting or revolving motion of a broad surface, for the purpose of producing artificial currents. Large revolving fans, driven by machinery, are frequently used either to facilitate the cooling of fluids or the process of winnowing, or as blowing-machines to urge the combustion of a fire, or to assist in ventilation. Another application of such an apparatus is for the purpose of regulating or checking, by the resistance of the air to its rapid motion, the velocity of light machinery. A familiar example of such a use is afforded by the revolving fans of a musical snuff-box.

In its more ordinary acceptation the name fan is limited to the well known instrument employed by ladies for producing refreshing coolness, the use of which, under the names *flabellum* or *flabellulum* in Latin, or ῥιπὶς or ῥιπιστήρ (diminutive, ῥιπίδιον) in Greek, was well known to the antients, whose fans, however, according to the article 'Flabellum' in the
'Dictionary of Greek and Roman Antiquities,' edit
Smith, were not, like most of those now used, 'so c
that they might be furled, unfurled, and fluttered, nor
even carried by the ladies themselves,' so that, as
of that article observes, the various manœuvres so
scribed in the 102nd number of the 'Spectator' as
cise of the fan' were wholly unknown to the antien
the numerous references given in the article above r
it would appear that while antient fans were often
forms, of delicate colours, and of costly and splendid
such as peacocks' feathers, they were stiff and of a fi
Some were made of separate feathers joined at the
further united by a thread passing along their tips, a
tied to the middle of the shaft of each feather:
pear to have been made by fastening together, back
the two wings of a bird, and attaching a handle at
while others again were formed of linen stret
a light frame. They were usually held by fem
beautiful boys, or eunuchs, whose duty it was to
so as to produce a cooling breeze; and the empl
such attendants was not confined to ladies, for
Suetonius that the Emperor Augustus had a slave t
while asleep. Fans of a softer kind, to which th
muscarium or μυιοσόβη was applied, were used for
flies from living persons, from articles of food,
things offered in sacrifice; and another kind of fa
ployed for urging the combustion of a fire, a pract
to conclude our quotations from the source already
'gave origin among classical writers to expressi
sponding to ours, meaning to fan the flame of ho
or of sedition.'

Fans are much used in China, India, and othe
countries, and those of the Chinese are made to
the same way as those commonly used by Europ
Among this people fans are used by both sexes,
closed in a worked silk sheath being one of the
accoutrements. Representations of such a fan with
and of a fop making use of one, are given in D
nese' (Weekly Volume edition, vol. ii. pp. 3
These appear to be of either paper or silk, but wit
nese, as well as the Europeans, fans are sometime
elegantly carved or perforated slips of ivory. W
the materials employed, much skill is often displa
decoration of fans, and in some cases artistic talen
order has been applied in painting them. T
which they are constructed to open or fold togeth
sure is too well known to need description.

In the ceremony of ordaining deacons in the G
a fan is put into their hands, to indicate the duty
volves upon them of keeping flies off the priests
sacraments.

FANTUZZI. [TRENTO, ANTONIO DA, P. C. S

FARINA'TI, PAOLO, a celebrated painter
where he was born in 1522. He studied first und
Giolfino, at Verona, and afterwards under Gio
Titian at Venice. There are several excellent wo
and in oil by him in the principal cities about Ve
he and his wife died, in 1606, on the same day.
design is robust and vigorous, similar to that of Juli
and his colouring has much of the character of t
Venetian school. He etched a few designs from
mythological history: they are described by Barts
(Ridolfi, *Vite de' Pittori*, &c.; Lanzi, *Storia*
&c.; Bartsch, *Peintre-Graveur*.)

FARRIERY. [HORSE, P. C.]

FAUNA, a term employed by naturalists to e
whole of the members of the animal kingdom livi
ticular district or at a particular time. Thus all t
living in Great Britain constitute the British Faun
inhabiting the land form the terrestrial Fauna; thos
the seas constitute the marine Fauna. It is ofte
collectively to all the animals of the world, the extin
constituting the fossil Fauna, and the living specie
Fauna of the world. The word is derived from
[FAUN, FAUNUS, P. C.], who were supposed to be t
of wild animals.

The word Flora is also applied in the same way
prehend the whole of the plants of a district, and
the same applications as the term Fauna. It is der
Flora, the goddess of flowers. [FLORA, P. C.]

FAVOSI'TES, a genus of fossil Zoophyta, comm
Silurian strata of Norway and Wales (Murchison, *Sil.*

FAVULA'RIA, a generic title of certain fos illaria, as F. tessellata, from the coal formation

RS, considered anatomically, as the covering of ated of under BIRDS, P. C., p. 426. We may w words on the uses to which they are applied of trade, a subject which is more fully treated cles on the nature and uses of feathers, in Nos. of the 'Penny Magazine,' to which, and to the ners' in Dr. Ure's 'Dictionary of Arts,' &c., we debted for the following particulars.

gal uses to which feathers are applied are for ation, as plumes for ladies' head-dresses, or for ilitary officers: as a soft and highly elastic ma- ng beds, cushions, and pillows: or, in the case quill-feathers, as writing-pens, or small tubes for ure of hair-pencils, or similar purposes. For the purposes their elegant appearance is their great ion: for the second, to which only the smaller applied, their exquisite softness, and that elas- ularity of structure which renders them less together, under the influence of pressure, than wolly or hairy substance which is applied to the : while the last-mentioned use depends on their a hollow quill or barrel of a horny texture. h found in all feathers, is only sufficiently large those of the wings and tail to be useful for such

ious kinds of feathers employed as plumes for the most important are those of the ostrich næ, P. C., p. 141], of which there are various those of the male bird, according to Dr. Ure, as being the whitest and most beautiful: those k and above the wings being considered the best, wings next in quality, and the tail-feathers the . The *down*, which is black in the males and females, consists of the smaller feathers from of the body, which vary in length from four to es. The finest white feathers of the female bird at grey towards the end, which lessens their ese feathers,' Dr. Ure states, 'are imported from is, Alexandria, Madagascar, and Senegal, this der of their value.' Probably that which Dr. *wn* is what is referred to by Mc Culloch (*Dic- Commerce*, art. 'Feathers') in the remark that part of the ostrich plumage is generally deno- , to which it bears a resemblance, and is used in ture of hats.' The mode of preparing ostrich se, and of dyeing them of various colours, is mi- ibed by Dr. Ure, who observes that most other by the plumassier are prepared in the same way. t washed or *scoured* by rubbing with the hand ously tied up in bundles) in a lather of white ater, and subsequently in clear water, as hot as bear. They are then bleached by three succes- ns, the first being to immerse and agitate them vater mixed with Spanish white, after which they n three clear waters in succession: the second, led *azuring*, to pass them quickly through a bath containing a little indigo tied up in a fine cloth: l, *sulphuring*, or exposing them in a close vessel ir of burning sulphur, in the same way as in the f straw hats and bonnets. The feathers are then ging upon cords, during which they are shaken time to separate their fibres. To increase their ribs are scraped with a bit of glass cut circularly: rt the requisite curly form to the filaments or dge of a blunt knife is drawn over them. The r dyeing we need not quote, further than that, rs except black, the feathers should be previously d by exposure to the action of sun and dew, which y cutting the end of the quill or tube to a sharp ticking or planting the feathers singly in grass re they are left for fifteen days.

from allusions to feather-beds in a statute of the enry VII., quoted in the 'Penny Magazine,' as they were known and used in England upwards nturies ago. Goose feathers, which, owing to r elasticity, are preferred for this purpose, are est when they are plucked from the living bird: districts where geese are chiefly kept, this cruel hich is alluded to under POULTRY, P. C., p. 482, from three to five times in a year. While most demn this practice for its apparent barbarity, and some assert that, in cold weather, many birds die in consequence of being subjected to it, it is asserted in the article 'Lincolnshire,' in the recent edition of the 'Encyclopædia Britannica,' that the breeders deny the imputation of cruelty, and say that they, for their own profit, pluck only such feathers as are very near falling off, and the removal of which consequently gives but little pain, because as such as are firmly fixed have a little blood at the end, they are less valuable. However such a plea may be received in extenuation of the custom as practised by the more humane or enlightened breeders, there is evidence enough of the barbarity of the practice in other cases. Young birds are plucked as well as those of mature growth, early plucking being supposed to promote the rapid growth of the feathers. Goose feathers are divided into white and grey, the former being deemed the most valuable. The less valuable kind of feathers, known by the general name of *poultry feathers*, are obtained from turkeys, ducks, and fowls. Wild-duck feathers are both soft and elastic, but their value is impaired by the great difficulty of removing the disagreeable odour of the animal oil which they contain. Various methods are practised of cleansing feathers from their oil, and the Society of Arts presented a reward of twenty guineas in 1805 to Mrs. Richardson for a process considered superior to any then practised, in which the feathers were immersed for three or four days in lime-water compounded of 1 lb. of quick-lime to a gallon of water. After being steeped for this time the feathers were placed on a sieve, to allow the lime-water to drain away: they were then washed with clear water and spread upon nets to dry, the whole being shaken from time to time, by which the dried feathers fell through the meshes of the nets. The whole process occupied about three weeks, and at its conclusion the feathers were said only to require beating for use. Lime is used by the Irish in the preparation of feathers, but, being applied too plentifully, they become loaded with dust, and consequently bear an inferior character in the market. In small quantity it appears likely to aid in the preservation of the feathers, to which small portions of animal fibre will occasionally adhere: but Dr. Ure seems opposed to its use, observing that 'bleaching with lime-water is a bad thing, as they can never be freed from white dust afterwards.' 'Their only preparation,' he states, 'when cleanly gathered, is a slight beating to clear away the loose matter, but for this purpose they must be first well dried either by the sun or a stove.' Judging however from the communications made to the Society of Arts ('Transactions,' vol. xxiii. pp. 210-215), it would appear that the plan above described was successful in cleaning some feathers in a perfectly raw state, and others which, after being stoved for the usual period of three days, retained their unpleasant smell.

The purification of bed-feathers by the agency of steam has recently been practised on an extensive scale in London by Mr. Herring. By the process employed, which is secured by patent, and is applicable either to new feathers or to such as have become deteriorated by use, the feathers are so greatly improved in softness and elasticity that a much less quantity of them than of feathers prepared in the ordinary way suffices to make a good bed. From a testimonial addressed to the patentee by Dr. Ure, it appears that the surplus feathers, removed in consequence of this improved elasticity, from three beds which were submitted to this process, were found sufficient to make a fourth bed of excellent quality, of 40 lbs. weight.

The softest and finest kind of feathers employed for bedding are those from the breast of the eider-duck, known in commerce as eider-down, of which an account is given under FULIGULINÆ, P. C., p. 6. Dr. Ure says that this exquisitely soft down should never be slept upon, as it thereby loses its elasticity, but should be used only as a covering. A similar substance, though in less quantity, is procured from the swan, the goose, and some other birds.

For the third of the above-mentioned uses of feathers the quills of the goose are most generally employed, though, for purposes where great size and strength are required, those of the turkey and swan are highly prized. When geese are plucked several times in a year for other feathers, the quills are only taken at the first plucking, about the end of March. As taken from the bird, the horny substance of the barrel of the quill is covered, both internally and externally, with a vascular membrane, which adheres very closely to it, and the substance of the quill itself is opaque, soft, and tough. The quills must therefore be subjected to certain operations by which the membranes may be detached and dried up, and the barrel rendered transparent, hard, and somewhat brittle; previous to which they are sorted into *primes*, *seconds*, and *pinions*, the first of which consists of the largest and longest barrelled quills, and the others of such as possess these characteristics in a less degree. They are further sorted into right and left wing feathers, in order that all tied up in one bundle may have the same curvature; and before tying up for sale the *barb*, or feather proper, is usually stripped off from the inner edge of the stem, in order that they may lie compactly together. In a goose's wing it is only the five exterior quills which are fit for making pens, and of these the first is the hardest and roundest, but the shortest, and the second and third are considered the best.

'Dutch quills,' observes Dr. Ure, 'have been highly esteemed, as the Dutch were the first who hit upon the art of preparing them well, by clearing them, both inside and outside, from a fatty humour with which they are naturally impregnated, and which prevents the ink from flowing freely along the pens made with them.' 'The Dutch,' he adds, 'for a long time employed hot cinders or ashes to attain this end; and their secret was preserved very carefully, but it at length transpired, and the process was then improved.' In the improved method the barrel end of the quill is plunged for a few seconds in a sand-bath, heated to about 140° Fahr., and then rubbed strongly with a piece of flannel. After this it appears white and transparent. 'Both carbonate of potash and sulphuric acid,' observes our authority, 'have been tried to effect the same end, but without success.' The above process is, however, sometimes followed by a brief immersion in dilute muriatic acid, which gives the appearance of age to the quills. They must afterwards be made perfectly dry. The above is described by Dr. Ure as the French process; he notices two other modes adopted by London quill-dealers, the first of which is styled the Dutch method. In it the workman, who is styled a Dutcher, sits before a small stove fire, into which he thrusts the barrel of the quill for about a second. Immediately upon withdrawing it from the fire, he draws it under the edge of a large blunt-edged knife, called a *hook* (shaped somewhat like a patten-maker's knife, and, like it, having a fulcrum at one end, formed by a hook and staple, and a handle at the other end, by which pressure may be communicated), by which it is forcibly compressed against a block or plate of iron, heated to about 350° Fahr. By this process the barrel, which is rendered soft and elastic by the heat, is pressed flat, and stripped of its outer membrane, without danger of splitting. It springs back to its natural form, and the dressing is completed by scrubbing with a piece of rough dog-fish skin. The principal workman employed in this operation can pass 2000 quills through his hands in a day of ten hours. In the other method alluded to, which is considered inferior as regards the quality of the quills for pen-making, although it makes them somewhat more pleasing to the eye, the quills are first stained yellow by steeping them for a night in a decoction of turmeric, then dried in warm sand, and subsequently scraped by the Dutcher in the manner above described. Steaming for four hours has also been suggested as a good mode of dressing or preparing quills. By whatever process the external membrane is removed, that inside the quill remains, separated from it, and shrivelled up in the centre of the barrel, until it is cut open to convert it into a pen.

FEDERI'CI, CAMILLO, an Italian dramatic writer of note (born at Garessio in Piedmont, April 9th, 1749), whose real name, Giovanni Battista Viassolo, is, like that of Poquelin (Molière), quite lost in one which he assumed on joining a company of actors and beginning to write for the stage, and which he took from the title of his first dramatic effort, 'Camillo e Federico.' Intended by his family for either the church or the bar, he was educated accordingly at Turin, but a passionate taste for the theatre, which had captivated his imagination while he was yet in his boyhood, prevailed over all other considerations, and urged him to a step which he afterwards regretted, only because it had distressed his parents —more especially a tenderly attached mother. After being for some years in different companies in the double capacity of a performer upon the stage and a writer for it, he had, in 1777, the good fortune to find an excellent wife in the widow of Vicenzo Bazzigotti, who had realized some fortune by the theatre as a manager. The union was a happy one on both sides, for his wife was not only an amiable, but an intelligent and well-educated woman, possessing considerable literary taste. Cured of his youthful illusions and desirous of enjoying the repose of domestic life, Federici quitted the 'boards,'
and settled at Padua, where he employed himsel
ing a succession of new pieces for the theatres
city and Venice. The juncture was a favoura
Goldoni's popularity was upon the wane, G
Carlo, P. C.] had ceased to write for the stage
was altogether forgotten. Without treading in
of Goldoni, Federici showed himself a worthy
him, inferior in comic force, but equally fertile i
and more varied in his subjects, many of his pie
a serious and sentimental kind—then just brough
in Germany—accordingly answering better to
domestic drama than comedy. Federici's fame
fined to the applause of the public whose favour
immediately in view, for his pieces were broug
equal success in almost every theatre throughout
this full tide of prosperity, which might else h
unabated, was suddenly checked by a calamity
prudence could neither foresee nor avert. He
in 1791 by a malady of the chest, that rendered h
of all exertion, either bodily or mental, nor did h
wards recover from it further than to be able to
to his wife or one of his sons, who served him as
To add to his distress, soon after his disorder firs
he learnt that Pellandi, the manager of one of th
for which he had written, had surreptitiously sold
of his pieces to a publisher at Turin—an inju
increased celebrity it brought to his name could
The best consolation which he received during
protracted suffering to which he was doomed
the meridian of life, was that afforded him by th
attentions of his wife and his two sons (Carlo an
who, after distinguishing themselves at the Univer
practised successfully—the one in his legal, the
medical career). Federici died December 23rd,
a more unblemished moral character than ca
claimed for writers of his class. Amiable and
he had invariably resisted every proposal to his
member of any literary or learned society, but
prevent one public mark of honour being paid h
a medal being struck, with the head of Alfieri on
his own on the other—as the effigies of the t
writers whom Piedmont had reason to be prou
given birth to. The high reputation he obtained
upon what might else pass for the undue part
countrymen, since it has been confirmed by the
foreign critics. One quality that recommends his
is the healthy tone of morality that generally per
neither is it the least of his merits, that he enlar
sources of the Italian stage, by bringing subjects
were calculated to amend and improve as well as
sides his serious pieces—and the serious drama of
is not confined to any one rank of society—he pro
tragedies, which would, however, hardly have as
in the manner above-mentioned with Alfieri.
complete collection of his works is that publishe
title of 'Opere Teatrali di Camillo Federici,' Pa
nezia, 1802-16, in fourteen volumes.

FE'DIA. [Valerianella, P. C.]

FEE FARM RENT. [Rent, P. C.]

FEIGNED DISEASES. There are few subje
with more difficulty than the detection of feigne
especially when they are the result of a system wh
of a constant refinement of the deceit by practice.
been especially the case in France, where the
been to escape the conscription. Foderé has observ
was brought to such a perfection as to render it as
detect a feigned disease as to cure a real one.' T
which usually lead to this practice are—1, A n
obligation. This is frequently the case in the army
where the men will pretend to be ill to escape duty
their discharge. In this form it has got the name
gering. Beggars, too, often feign illness when they
work, preferring the easy task of soliciting cha
labour of an occupation. 2, The hope of gain. T
comes into operation where the object is to obtain
the parish, to impose upon the benevolence of priva
to procure the allowances of benefit-societies, club
get admitted into an hospital, or to obtain compe
some pretended injury. 3, To procure release fro
ment or an exemption from punishment. This m
source of deceit with boys and girls at school, per
mitted to prison, &c. To these may be added th
exciting the sympathy or gaining the attention

re no hope or need of gain exists. This motive acts in all es of society, and leads individuals of otherwise the est moral character to imitate all forms of disease. It is rved most frequently in young and unmarried females, is frequently carried to the extent of feigning diseases for h capital operations are required; and instances are not ting where surgeons (not much however to their credit) removed legs, breasts, and arms at the solicitation of such nts.

here is no natural limit to diseases which may be feigned; some being much more easily imitated than others, and easily detected, are most frequently assumed. Feigned ases may be divided into, 1, those which are obvious to senses; 2, those depending upon the description of the ostor, and, 3, those of a complicated nature, presenting ptoms of both kinds. Amongst diseases obvious to senses are an increased or diminished size of parts, nds, malformations, ulcers, discharges, spasmodic and lytic affections. A favourite mode of increasing the size arts, and producing tumors, is by injecting air beneath the ular membrane. In this way such diseases as dropsy, l and general, hernia, hydrocele, varicose veins, ele- ntiasis, œdema of the extremities, may be simulated. ssure also, by means of ligatures, &c. on the veins, will duce swellings of parts of the body. Swellings also of the ts, so as to resemble white swellings, are produced by the lication of various acrid plants, as the ranunculus acris and leratus to the part. Polypi, hydatids, malignant tumors, hæmorrhoids, are imitated by affixing in some manner intestines and other viscera of animals to the parts of the ly in which these diseases occur. Cancer has been imi- d by a cow's spleen, and by a sponge moistened with milk d under the arm-pit. The various malformations of the ly are feigned by obstinate and long-continued flexion of part, aided by inaction and the use of tight bandages. etimes these contractions are accompanied by a wound, in r to prove that they have been effected by a burn. Many s have been proposed for detecting this class of imposi- , such as compressing with a tourniquet the nerves that ly the contracted muscles; applying a wet bandage tightly d the limb, so that when it becomes dry it may overcome ontraction; moving the contracted limb during natural or that produced by narcotics; or making extension t the person is under the influence of an emetic, or when ttention is directed to other objects, recommending the of Africa, or some other disagreeable thing, as a cure. nds and sores are produced in a variety of ways. Wounds, self-inflicted, will always be in positions where persons get at the spot where they exist, with their own hands. mplices are however sometimes engaged even in this. rs are among the most common of feigned diseases. They roduced by red-hot iron, by caustics, as corrosive acids lkalis, and the juices of various plants, as of the ranun- acris and sceleratus, the spurge-laurel, the euphorbium, maculatum, and juniper. Where persons are suspected eeping up ulcers in their legs by irritants, the placing their in a box and locking them up will allow the ulcers to heal. various forms of cutaneous disease are produced by the ap- tion of irritants to the skin, as pounded garlic, euphorbium, harides, gunpowder, nitric acid, bay salt, &c. The dis- ration of jaundice is imitated by various dyes, as well as appearance of bruises. Ophthalmia is a disease often ned, and is commonly produced by the application of tants, as snuff, pepper, tobacco, blue vitriol, salt, alum,

The progress of the inflammation in these cases is lly more rapid than in the idiopathic form. It is mostly confined to one eye, for obvious reasons; and when oc- ring in the army it may be suspected, if epidemic, when it comes on in privates and non-commissioned officers. eased discharges are often simulated. Vomiting is ef- ted by pressing on the pit of the stomach, by swallowing by strong and sudden action of the abdominal muscles, by ling the fauces, and the use of emetics. Diarrhœa and entery are produced by taking drastic purgatives. Frag- nts of brick, slate, small pebbles, pieces of quartz, and flint, e been introduced into the urethra, to bear out the alleged tence of urinary calculus. Hæmaturia has been simulated by ing the urine with various colouring matters, and the disease really been brought on by the taking of savin, cantharides, turpentine. Spitting of blood is a favorite assumed dis- . It is simulated by placing a sponge in the mouth filled bullock's blood, by cutting the mouth and gums, and by ing blood from other parts of the body. A vomiting of urine and fæces have taken place by the stealthy introduction of the contents of the bladder and rectum into the stomach.

The spasmodic diseases to which the system is subject have been imitated with great success, and none more so than epilepsy. It has for its peculiar recommendation, that the person who is subject to it may be well at intervals and assume the attacks when it best suits him. The best criterion of imposition is the want of the total insensibility which characterises the true fits. In the feigned disease the application of stimulants will seldom fail to elicit indications of sensibility. Hartshorn or burning sulphur may be introduced under the nose; alcohol and turpentine may be dropped into the eye, and mustard or common salt placed in the mouth. Pricking the skin with sharp-pointed instruments has also been recommended. This however is frequently resisted. Dr. Guy recommends 'flecking' the feet with a wet towel. He says he has by this means aroused a patient from a mesmeric slumber when all other mechanical stimulants and cold affusions had failed. Convulsions are often imitated; but where they are fictitious they cannot be sustained for any length of time without great exhaustion. Chorea is also often imitated. Electricity and cold affusions are the best remedies for this disease, and are likely to be effectual in the case of impostors. Hysteria, catalepsy, tetanus, hydrophobia, some forms of tonic spasm, stammering, strabismus, and difficulty of swallowing, are other diseases of the nervous system which are often imitated. Paralytic affections are also frequently simulated. The treatment resorted to for the cure of these diseases, when natural, would be found a trying ordeal for most impostors. Cases however are related in which impostors have resisted the most active treatment; and a case of simulated lethargy is on record, in which an individual resisted with only a single groan the operation of trephining.

Another class of feigned diseases are those which depend chiefly upon the description given by the impostor. These are all embraced in increased and diminished sensations. Increased pain of one or many organs is commonly feigned. It is easily assumed but not easily detected, as many pains, such as that of tic douloureux, come on in an apparently healthy state of the system; and many pains of a severe character are dependent on exceedingly obscure causes. There are no rules which can be laid down for the detection of simulated pain; and it is only those who have extensively observed the effects of real pain on the system, that can readily distinguish that which is pretended. Of diminished sensations, blindness and deafness are those most frequently feigned. Amaurosis may be really produced for a time by the application of belladonna, henbane, spurge laurel, and tobacco; but under these circumstances it disappears when the impostor is carefully watched. Deafness is often assumed, but it may be detected by unexpectedly or sharply calling out the name of the individual, by calling him by name when asleep, or letting a piece of money fall close to him. Dumbness has been successfully feigned, and cases are recorded which resisted every attempt at discovery. It may be frequently detected by giving the person a sudden and unexpected knock, or a prick with a pin.

Sometimes general diseases are assumed, embracing a collection of symptoms. Of these, the most frequently assumed are fever, ague, rheumatism, phthisis, asthma, dyspepsia, jaundice, inflammations of the bowels, stomach, and kidneys. These feigned diseases are only to be detected by a knowledge of the real diseases, when a correct diagnosis is not often difficult. Of diseases involving complicated symptoms, that of unsoundness of mind is most frequently and most successfully feigned. The success however does not depend so much on the ease with which the symptoms of true insanity are imitated, as upon the ignorance that prevails of the distinguishing characters of real insanity. When these are once known an impostor may be easily detected. The most frequent form of assumed madness is general mania. In addition to the characters of the true disease, special tests have been proposed, such as the use of the whirling chair, and 'repeating to the suspected person a series of ideas recently uttered, when the real maniac will introduce new ideas; the impostor, on the contrary, will deem it expedient to repeat the same words.' (Guy.)

The following general rules for detecting feigned diseases have been given by Zacchias:—

1. The first is, that the physician must in all suspected cases inquire of the relatives and friends of the suspected individual what are his physical and moral habits. He must ascertain the state of his affairs, and inquire what may possibly

be the motive for feigning disease, particularly whether he is not in immediate danger of some punishment from which this sickness may excuse him.

2. Compare the disease under examination with the causes capable of producing it—such as the age, temperament, and mode of life of the patient. Thus artifice might be suspected if a person in high health and correct in his diet should suddenly fall into dropsy or cachexia; and again if insanity should suddenly supervene without any of its premonitory symptoms. It is contrary to experience to find such diseases occur without some previous indications.

3. The third rule is derived from the aversion of persons feigning disease to take proper remedies. This indeed will occur in real sickness, but it rarely happens when severe pain is present. Anything that promises relief is generally acceptable in such cases; those on the contrary who feign delay the use of means.

4. Particular attention should be paid to the symptoms present, and whether they necessarily belong to the disease. An expert physician may thus cause a patient to fall into contradiction, and lead him to a statement which is incompatible with the nature of the complaint. To effect this it is necessary to visit him frequently and unexpectedly.

5. The last direction is to follow the course of the complaint and attend to the circumstances which successively occur.

(Beck, *Medical Jurisprudence;* Thomson, A. T., *Lectures on Medical Jurisprudence;* Guy, W. A., *Principles of Forensic Medicine.*)

FELT, FELTING. [SHEEP, P. C., p. 356; HAT, P. C., p. 64; WOOLLEN AND WORSTED MAFUFACTURES, P. C., p. 552.]

FEME COVERT. [WIFE, P. C.]

FENESTE'LLA, a beautiful and abundant genus of fossil Zoophyta, allied to Retepora, which occurs in the whole Palæozoic series (Lonsdale, *Sil. System*, &c.).

FERNS. [FILICES, P. C. S.]

FERO'NIA, the name of a genus of plants belonging to the natural order Aurantiaceae. The flowers are often polygamous. The petals are usually 5 in number, occasionally 4 or 6, spreading. The calyx is flat and 5-toothed. Stamens 10; filaments dilated and united at the base; anthers linear-oblong, tetragonal. The ovary is seated on the elevated disk, 5- occasionally 6-celled; ovules numerous in each cell. It has scarcely any style and an oblong stigma. The fruit is enclosed in a hard rind, 5-celled and many seeded, which seeds are immersed in a fleshy pulp. The leaves are pinnated with from 5 to 7 leaflets nearly or quite sessile, very slightly crenulated, with pellucid dots along the margin, inconspicuously dotted elsewhere; the racemes are axillary, terminal, and few-flowered.

F. elephantum is the Elephant or wood apple of the Coromandel coast, where it is very generally eaten. The branches of this tree are armed with small spines. The leaflets, which vary in number from five to seven, are small, obovate and smooth; when very young they are thin, and when bruised have a most fragrant smell resembling anise. The native practitioners of India consider them stomachic and carminative. After a certain age however the leaves become tough and almost coriaceous. The fruit is fleshy, and extremely acid before it arrives at maturity; but when ripe, it contains a dark brown agreeable subacid pulp. In appearance the fruit is large, spheroidal, rugged and often warted externally; the seeds are in five parcels and are flat and woolly, adhering to the branched placentae by means of long cords.

A transparent oily fluid exudes from the trunk of this tree when an incision is made into it, which is used by painters for mixing their colours. A clear white gum may also be obtained from the tree very much resembling gum-arabic. The wood is likewise valuable on account of its durability, whiteness, and hardness.

F. pellucida has leaves full of transparent dots; the common petiole round, pubescent: this tree usually attains a height of twenty feet, and is a native of the East Indies, where the fruit is generally eaten. The flowers are white.

In cultivation these trees thrive well in a mixture of turfy loam and peat: and ripened cuttings will strike root in sand under a glass exposed to heat.

(Lindley, *Flora Medica;* Don, *Gardener's Dictionary.*)

FERRA'RI, GAUDENZIO, a celebrated Lombard painter and sculptor, of the Milanese school of Lionardo da Vinci. He was born in Valdugia in 1484, was instructed by Luini, and worked under Raphael at Rome. He is enumerated by
his countryman Lomazzo among the seven greatest p
modern times, which is an absurd eulogy. He was
design, laborious and careful in his execution, and
brilliant in his colouring; but his works are qui
tone, though his figures are well rounded, and he
had no knowledge of or feeling for harmony of col
outline is also hard, and the accessary parts, though
are very indifferently executed. His colouring is
gay, but he used the positive or primary colours
natural proportion. His principal works are in Mila
exclusively illustrative of the origin or mysteries of C
He died in Milan in 1550. (Lanzi, *Storia Pittori*

FERRI, CIRO, a celebrated Roman fresco paint
1634. He was the most distinguished scholar of
Cortona, and greatly assisted that painter in his exten
in fresco, both in Rome and in the Palazzo Pitti at
After the death of Pietro, Ferri was the first fre
in Rome, and the leader of the so-called *machini*
faction, opposed to the school of Sacchi, at the hea
was Carlo Maratta. [ROMAN SCHOOL OF PAINT
Ferri's works are of the same character as Pietro da
many of them have been engraved. He died at Ro

(Baldinucci, *Notizie dei Professori del Disegno*,
Storia Pittorica, &c.)

FETI, DOME'NICO, called Il Mantuano,
Rome in 1589. He was the scholar of Cigoli
appointed his court painter by Ferdinando Gonza
Mantua, whither he removed from Rome; whenc
of Mantuano. He died at Venice in 1624, aged
five.

Feti executed several works at Mantua, of wh
pictures were the best; many have been engraved:
piece is the Feeding of the Five Thousand, in th
of Mantua.

(Baglione, *Vite de' Pittori*, &c.; Lanzi,
torica, &c.)

FEUILLEA, a genus of plants belonging to
order Cucurbitaceae, and named in honour of Lou
a traveller in Chili, the author of several works
The flowers of this genus are dioecious. The s
flowers have the calyx 5-cleft beyond the middl
rather joined at the base; 5 stamens inserted with
and alternating with them; sometimes there are
but when this occurs 5 of them are always sterile.
tiliferous flowers have the tube of the calyx ad
ovarium, with a 15-cleft limb. They have 5 pet
or joined at the base, and oblong; 3 styles. Sti
and bluntly bifid. Fruit globose, fleshy, with a
round the middle, and five other scars, 3-celled,
bark, and a large fleshy trigonal central axis. The
numerous, standing erect upon the axis. The see
compressed. Cotyledons flat and rather fleshy.
is a native of the tropical regions of America, and
species are frutescent climbing herbs. They have
stalked, cordate, smooth leaves, and small flowers.
drils are axillary, spirally twisted, in place of pedun
seeds are oily and of a bitter taste; their unctu
causes them to be used for burning, and their exces
ness renders them good anthelmintics; they are als

F. punctata has 3-lobed or ternate leaves, best
dular dots on both surfaces along the nerves, but
cially beneath. The lobes of the leaves are lan
rather cut. It is a native of St. Domingo.

F. trilobata has leaves which are rather glandul
surfaces, 3-parted or trifid, the lower lobes obtuse,
ones acute. This species is a native of Brazil.
Feuillea scandens of some authors, and the celeb
dirhoba or Ghandirhoba of South America, wher
in great repute as an antidote to various poisons,
vegetable. The natives employ it not only again
bites, but also to counteract the baneful effects of th
and Manchineel. M. Drapiez, after having made e
expressly to test its power, states that animals pois
hemlock, nux-vomica, the Rhus Toxicodendron.
restored by the administration of the seeds of this p
recommends that the seeds be bruised in a little w
asserts that it is equally efficacious as an antidot
taken internally or applied to a poisoned wound
seeds act with great rapidity as emetics and purgati

F. cordifolia has glandless, cordate, acuminate lea
what 3-lobed and rather serrated. It is a native of
Indies, and has likewise a reputation as a preventi
ill effects of vegetable poisons.

la has glandless roundish leaves sinuately cordate
iate. It is a native of New Granada in the woods
aco, where it is known by the name of Javilla.
have winged margins; hence this species agrees
enus Zanonia.

t of the Feuillea is as large as an apple, and from
esemblance it is called the 'shaving-box.'

rich soil is found to suit best the species of Feuillea,
:s will easily take root in a hot-bed or glass frame
heat. Being creeping plants, they are well adapted
: up rafters in stoves.

Gardener's Dictionary; Lindley, *Flora Medica*;
utlines of Botany.)

IINGO. [Calvert, Denis, P. C. S.]

IA. [Ranunculus, P. C. S.]

)ITES. [Stigmaria, P. C. S.]

, NATHANIEL, whose name is for several rea-
sting in the history of the old English drama, was
ly a player. As early as the year 1600 he was
Children of the Chapel, afterwards called Children
vels, youths who were trained to act plays before
and he continued in that company till after 1609.
became a member of Shakspere's company, the
the Globe and Blackfriars theatres, among whom
l in the list prefixed to the folio of Shakspere's
ed in 1623. Two years later his name disappears;
l he is mentioned as 'gone,' which probably means
then dead. Besides these circumstances, the only
in his history are such as show him to have been
istressed. He was the writer of the famous beg-
addressed to Henslowe, by himself, Daboone, and
ssinger: and among Henslowe's papers are two
s of the same melancholy tenor. Field wrote a
erhaps Gifford does him less than justice in the
assigns to him, of the fine tragedy of 'The Fatal
inted among the works of its other poet Massinger.
he author of two comedies, both good, and one of
lent, both of which were written between 1605
'A woman is a Weathercock,' first printed in
'Amends for Ladies,' first printed in 1618, and
539. Both are included in a small collection,
English Drama,' 4 vols. 12mo., 1830; and in
upplement to Dodsley's Old Plays,' 1833. They
pirit, incident, and variety.

LE, FRA GIOVA'NNI DA, frequently called,
aracter, Beato Angelico, is one of the most cele-
he early Italian painters. His real name was,
o Vasari, Giovanni Guido, and he was a distin-
mber of the brotherhood of Predicant monks at
is name is however variously given, as for instance,
i, and Giovanni di Pietro di Mugello. He was
born in Mugello in 1387, and he entered the order
icants at Fiesole in 1409; little or nothing further
ther of his origin or his education. He early dis-
imself for his miniature illuminations of religious
hich there are still some in the convent of San
lorence, where he painted several works for Cosmo
of which the history of the Passion of Christ in
y is still in comparative preservation. Giovanni
rt of illuminating or miniature painting from an
er, Fra Benedetto di Pietro di Mugello, or, Latin-
lictus Petri de Mugello.

ed also many admirable works in the Carthusian
Santa Maria Novella, and in the Nunziata and
hes in Florence; in San Domenico at Fiesole; in
al of Orvieto; at Cortona; and in the chapel of
o in the Vatican, and in the Minerva, at Rome.
vited to Rome by Pope Niccolò V., who offered
h dignity of the archbishopric of Florence, which
iovanni was too modest to accept; he pleaded that
or to lead was alike incompatible with his nature.
ntment was given to another monk of the same
Giovanni, Fra Antonino, who was canonized by
.

coes in the chapel of Niccolò V. are in great part
od state of preservation, though they have been
The chapel was long neglected, and public atten-
rst called to these frescoes by Hofrath Hirt, of
he principal subjects represent the leading events
of Saints Stefano and Lorenzo, and their martyr-
the ceiling are the four evangelists; around the
are the doctors and fathers of the church, Saints
quinas, Bonaventura, Athanasius, and John Chrysostom; Augustin, Ambrose, Jerome, and Gregory; and a Descent from the Cross was painted above the altar, but it has been whitewashed over. This chapel is described in Platner and Bunsen's 'Description of Rome,' and there are small outlines of the frescoes in D'Agincourt's 'Histoire de l'Art par les Monumens,' and larger in a special work by Giangiacomi, 'Le Pitture della Capella di Niccolò V., opere del B. Giov. Ang. da Fiesole,' Rome, 1810. Also two of the principal subjects, the Preaching of St. Stephen, and St. Lawrence giving alms, are etched in Ottley's series of plates after Florentine paintings. These works of Fra Giovanni, as well as those in the convent of Saint Mark at Florence, and others elsewhere, though as mere abstract designs or works of art they are comparatively crude and feeble, and inferior to the works of Masaccio, are with reference to their subjects perfect in their sentiment, and in expression admirable, and have not been surpassed even by the works of any of the great painters who followed him. His works are exclusively religious or ecclesiastical; and they breathe the purest piety and humility, which are the vivid impressions of his own mind and character, not acquired or imitated, but proceeding from himself in untutored reality, pure nature. The genuineness of his sentiment and expression was so self-evident, that his works became in a great degree, mediately when not immediately, the type of character for religious art, to his own and to subsequent generations.

Though his works have not as regards style that plastic development which we find in Masaccio, the inferiority is not great, but he survived Masaccio some years. Giovanni's execution is sometimes extremely elaborate and often beautiful, especially in his small easel panels painted in distemper. There is a small gallery of these works in the Academy at Florence, of which the most remarkable piece is a Last Judgment containing a great variety of figures.

Fra Giovanni was remarkably methodic in his habits; it was his maxim that whoever would represent the works of Christ must be always with Christ; he accordingly never commenced any work without praying, and he always carried out the first impression, believing it to be an inspiration: he never retouched or altered anything once left as finished. He died in 1455, twenty-eight years before the birth of Raphael.

(Vasari, *Vite de' Pittori*, &c., and the notes in Schorn's German translation; Speth, *Kunst in Italien*; Rumohr, *Italienische Forschungen*.)

FILA'GO, a genus of plants belonging to the natural order Compositæ, tribe Senecionideæ, subtribe Gnaphalieæ, division Helichryseæ. The outer florets are female, filiform in several rows, the outermost ones intermixed with the inner scales of the involucre or paleæ, central florets few, hermaphrodite, tubular. Pappus capillary. The receptacle conical with a scaly margin. Involucre subconical, imbricated, the scales lanceolate, and longer than the florets. The species of this genus were formerly referred to Gnaphalium.

F. germanica is a cottony plant with yellow florets, the stem proliferous at the summit from 4 to 12 inches long. It has lanceolate wavy leaves, heads in axillary and terminal globose clusters, the outer involucral scales cuspidate, cottony, with glabrous points. It is a native of Great Britain, as well as the two following species:—

F. minima is distinguished by having its stem dichotomously branched, and the outer involucre scales bluntish, cottony, with glabrous points. The florets are yellow with very small heads. Like the other species it is found in dry, sandy, and gravelly places.

F. gallica has linear, acute, revolute leaves, the heads conical in axillary terminal clusters, shorter than the leaves. This species is very rare.

(Babington, *Manual of British Botany*.)

FILAMENT, in Botany, the part of the stamens which bears the anther. It is sometimes long and slender, hence its name filament. In some plants however it is nearly or altogether absent, and not unfrequently flat and broad. [Stamen, P. C.]

FILE, a steel instrument having flat or curved surfaces so notched or serrated as to produce a series of fine teeth, or cutting edges, which are employed for the abrasion of metal, ivory, wood, &c.

Files are indispensable for the working of all metallic and many other hard substances, and without their aid few articles of machinery could be produced. Holland observes that the use of the file must have preceded every step in the progress of finishing articles composed of iron and steel in all cases where any intricacy of shape precluded the operation of grinding. He considers that, great as is the antiquity of the revolving grindstone, the file must have preceded it, and refers, in confirmation of this opinion, to the passage in the first book of Samuel (chap. xiii. v. 21), in which the file is mentioned as the means of sharpening the mattocks, coulters, and other edged instruments of the Israelites. He also refers to a passage in the Odyssey in which Vulcan is represented as using the hammer and file in fabricating the net in which he entangled Mars and Venus, as a proof of the great antiquity of this tool.

Files always are, or should be, made of steel of superior quality, as there are few instruments in which a defect in the metal is so completely destructive of utility. An axe, saw, or almost any other cutting instrument, though of inferior metal, may be made to do its duty by repeated whetting; but for a bad file, as Holland observes, there is no remedy,—no process of restoration. 'Let it,' he says, 'be too soft, and immediately on application the whole toothed surface of the file is crushed down, and ceases to be of any use for its intended purpose: if too hard, on the other hand, the teeth, so soon as they come into contact with the body to be acted upon, fly off with every stroke; the file thenceforward becoming, if not quite useless, certainly a coarse irregular rubber.' The importance, therefore, of a guarantee of excellent quality gives a high value to files bearing the marks of manufacturers of established reputation, and leads unprincipled tradesmen to imitate them. 'One of the most famous of these marks,' Holland observes, 'was that granted many years ago by the corporation of Sheffield to Daniel Brammall; and as an illustration of its value may be mentioned the fact, that in 1825 the rightful user obtained a verdict of 2000*l.* damages against a Birmingham file-maker for having struck it fraudulently on articles made by himself.'

Steel for making files, being required to be of unusual hardness, is more highly converted than for other purposes, and is sometimes said to be *double converted*. Small files, according to Dr. Ure, are mostly made of cast steel, which, he says, would be the best for all others, though its higher price prevents its use. 'It is,' he remarks, 'much harder than the blistered steel, and from having been in the fluid state, is entirely free from those seams and loose parts so common to blistered steel, which is no sounder than as it comes from the forge before conversion.' The very large files called smiths' rubbers are generally forged immediately from the converted bars, which are, for convenience, made square while in the state of iron. Smaller files are forged from bars or rods which are drawn or wrought as nearly as may be to the required form and size by the action of tilt-hammers, either from blistered bars, or from ingots of cast steel. These bars are cut into pieces suitable for making one file each, which are heated in a forge fire, and then wrought to the required shape on an anvil by two men, one of whom superintends the work, and is responsible for the goodness of the file, while the other acts as general assistant. Files being of many different shapes and sizes, as square, triangular, and flat, round, and half-round, in their cross section, and parallel or tapering more or less towards the end, and ranging from the minute watchmaker's files of two or three inches to the ponderous rubber of two or three feet, there are of course many varieties in the forging process. The square and flat files are generally shaped by the hammer only, but for those of a triangular or half-round section grooved bosses or dies of the required shape are attached to the anvil. Round files are made by means of the instrument known to smiths as a *swage*, which may be compared to a pair of such dies, one of which is inverted upon the other to receive the blows of the hammer. The projecting tang by which the file is to be inserted in a wooden handle is formed at this time, and the manufacturer's mark is impressed with a steel punch.

The next operation upon the files, or rather the blanks which are to be converted into files, is that of softening or annealing, technically called lighting or lightening, to render the steel capable of being cut with the toothing instruments. The ordinary mode of performing this operation is to pile them loosely upon the bottom of a brick oven, and heat them with a fire kindled beneath and around them, the heat being regulated by dampers. When the fire has been maintained sufficiently long (about twenty-four hours according to Holland, but merely long enough to make them red-hot, according to some other authorities), the pile is smothered with ashes, every aperture by which air could enter the oven is carefully closed, and the whole is left to
cool gradually. The access of air during the h
to the oxidation of the steel, and is consequentl
A better plan, therefore, is to inclose the files i
trough with a close cover, filling the interstices
and to cause the fire to play as gradually and
possible around it, until the whole mass becom
The cooling, in this, as in the other process, must
and if the cover be not removed until the whole is
the steel will be found quite free from the scaling
by oxidation, and of a silvery-white colour. If it
that the steel is *too kind*, or has too little carbo
charcoal may either be substituted for, or interstr
the sand in which the files are imbedded.

After annealing, the surface of the metal must
very smooth and even before cutting the teeth.
done either by *stripping*, or filing, first across, an
along the surface, or by grinding upon very large
The stripping process, which is tedious and la
formerly in common use, and is still practised b
makers, especially in Lancashire, where excell
manufactured; but the other is now the most com
production of a level or even surface being the
of this operation, it has been questioned whethe
fection could be attained by grinding as by the us
but this is a matter mainly dependent on the
operator; and the greater expense of the strippi
sufficient to preclude its general adoption.

The cutting of the teeth is usually performed
sitting astride upon a board or saddle-shaped sea
a well-lighted bench, upon which is fixed a k
anvil. Laying the blank file across the anvil,
secures it from moving by a strap which passes o
and under his feet, like the stirrup of the shoe
then takes in his left hand a very carefully g
made of the best steel, and in his right a pecu
hammer, the handle of which is fixed at such a
the operator can, while making a blow, pull
rather towards him. If the file be flat, or have
flat surfaces, the operator places the steel chisel
particular angle or inclination, and with one
hammer cuts an indentation or furrow, complet
face, from side to side, but most commonly in
direction, the metal displaced by this operatio
taken away, but thrown up in the form of
angular ridge, with a sharp cutting edge, o
of the furrow. He then moves the chisel a
by a second stroke cuts another precisely sim
parallel to, and at a very short distance from, th
thus proceeds stroke by stroke until the whol
furrowed, beginning at the point and ending at t
In the course of cutting, the file is gradually mov
operator by relaxing the pressure of the strap
time. In this state, the file is said to be *single-c*
float; and files so cut are used for brass and the s
which are liable to clog a file of any other kind.
iron and some other materials, *double-cut* or *cr*
are used, in which the first row or series of cuts i
an oblique angle by a second; the effect of which i
the surface, which in a single-cut file consists of
of minute parallel scrapers, into a collection of
angular teeth, admirably adapted for the abrasion
stances. In making cross-cut files, a fine file is g
over the first series of cuts or teeth to reduce the
to an even surface before the second set is cut.
wood are usually cut with a triangular pointe
chisel, instead of one with a flat edge reaching
whole width of the file, the cuts or indentation
produce single independent teeth, which are rang
the teeth of one row being opposite to the inte
other. Such files, as well as some of the d
coarsest cross-cuts, are called *rasps*. If the file b
half-round, or have any curved surface, it is still c
same kind of tool; but as a straight-edged cuttin
only make a short indentation upon a convex s
necessary to go round the file by degrees, maki
rows or ranges of minute cuts contiguous to one ano

Hitherto we have only spoken of the cutting of
but as most files are cut upon two or more sides
cessary to make some provision for protecting the s
cut from injury while cutting the others. This i
interposing a piece of lead, or of an alloy of lead
between it and the anvil. When the files are
round, or half-round, a block of the same soft met

e in which the file will lie steadily, is used in like

addition to variations in the form and arrangement of the
of files, their size varies extremely. The largest and
st smiths' files are called rubbers; and others, arranged
er of fineness, are technically known as rough, bastard,
l-cut, smooth, and dead-smooth files, the latter pro-
g so fine a surface when applied to metal that the subse-
application of a burnisher is sufficient to polish it.
the art of file-cutting, as observed by Mr. Dodd in the
referred to below, there are many points worthy of
k. 'In the first place, the angle at which the cuts are
depends greatly on the purpose to which the file is to
plied, and is made an especial object of the cutter's
ion. In the next place, the cut is not a mere indenta-
made without reference to form; it is a triangular
e of particular shape, the production of which requires
st discriminating tact in the management both of the
er and of the cutting-tool. Then, again, the strict
elism of the several cuts can only be brought about by
sed accuracy of hand and eye, since there is no guide,
, or other contrivance for regulating the distance. In
d file, too, the several rows or cuts are brought side by
n such an exact manner that it is difficult to conceive
to be formed singly and by hand.' 'We may,' he adds,
ce as an instance of what skill and long practice can
in this respect, a file about ten inches long, flat on one
nd round on the other; the flat side is cut with a hun-
and twenty teeth to an inch, so that there are about
e hundred teeth on that side; the round side has such
tent of curvature that it requires eighteen rows of cuts
mpass it; each little cut on this side is not much above
ntieth of an inch in length; and the number is thus so
that for the whole file there are twenty-two thousand
each made with a separate blow of the hammer, and the
g-tool being shifted after each blow.' The degree of
ss indicated in this example may be said to be unusual;
e calculation refers only to a single set of cuts, and con-
ntly, were the same file cut double with teeth of half
gree of fineness, the number of cuts required would be
me.

eral highly ingenious machines have been contrived for
eding the tedious operation of file-cutting by hand, and
ptions of some of these are given in the works referred
he end of this article; but, suited as the process may
to be for the use of machinery, it has been found to
t such great difficulties that we believe no file-cutting
has been brought successfully or extensively into ope-
One very serious difficulty arises from the circum-
that if one part of the file be either a little softer than
jacent parts, or narrower, so as to present less resist-
o the blow of the hammer, a machine would, owing to
rfect uniformity of its stroke, make a deeper cut there
elsewhere; 'whereas,' as Dodd observes, 'a workman
as been employed in the trade from a boy (and none
, it is said, can acquire the requisite skill), can feel in-
y when he arrives at any variation in the quality or con-
of the steel, and at once adapts the weight of his blow
Holland, after describing one of the machines con-
for this purpose, observes, that the applicability of such
paratus to the toothing of extremely fine-faced files seems
ivable, because 'in such the *set* or direction of the teeth
natter of much less importance than perfect equality of
ce;' thus intimating that a great difficulty arises in this
rently attainable point. 'The double dead-cut files of
French,' he adds, 'exhibit such a beautiful uniformity of
cation when examined with a magnifier, that no doubt
s to be entertained, by many persons conversant with
rt, of their being cut by machinery of some sort. But
ugh the French are so successful in the production of this
sitely delicate cutting, they are not equally so in the
tion of the rougher sorts; and, consequently, English
re in high reputation in Paris, whither large quantities
egularly transmitted.' This writer mentions a French
facturer of watchmakers' files, some of which, cut in
ommon manner, but with exquisite neatness, by his
ters, were regarded with suspicion by many, simply from
inion that they must be machine cut.

e final process in the manufacture of files is the hardening of
eel, a process in which different manufacturers vary in
ce. 'Some descriptions of rasps,' observes Holland, 'es-
ly such as are used upon wood and other soft substances,
t in their soft state after being cut, not only because little

hardness is required, but mainly that they may be sharpened up with a file occasionally.' 'Some sorts, too,' he adds, 'have been made of iron, and case-hardened.' The carbonaceous matter for such a process of case-hardening may be obtained from blood, or from any of the soft parts of animals, but the refuse of shoemakers and curriers is the most convenient. After the volatile parts of such animal matter have been distilled over, from an iron still, a bright shining coal is left behind, which, when reduced to a powder, is fit to be mixed with the salt in combination with which it is to be used. Equal parts, by bulk, of this powdered carbon and salt may be mixed with water to the consistence of cream, or the carbon may be mixed with a saturated solution of salt to the same consistency. Steel files, when intended to be very hard, may be covered with this composition previous to the hardening process; and by its use, files made of iron, which in itself is incapable of hardening, acquire a superficial hardness sufficient to answer the purposes of any file whatever. 'Files of this kind,' says Holland, quoting his account from some other work, though he does not say what, 'may be bent into any form, and, in consequence, are rendered useful to sculptors and die-sinkers.'

In the ordinary process of hardening steel files three things must be particularly observed,—first, to cover the surface of the file with some composition which, acting as a protecting varnish to it, may guard it from oxidation and scaling when exposed to the action of the fire, that the sharpness of the teeth may not be impaired, nor the surface rendered rough, which would cause it to clog when in use; secondly, to heat it very uniformly throughout to a red heat; and, thirdly, to cool it suddenly, by immersion in the freshest and coldest water, in such a manner as to impart the greatest degree of hardness, and to avoid the tendency to warping, which in long thin files is a difficult matter. A mixture very commonly used for the first-mentioned purpose consists of the grounds of malt liquor, yeast, and common salt. Formerly the ale grounds were applied alone, and powdered salt was thrown on to the wet files; but the plan of dissolving the salt in the liquor is the best and most economical. In the present plan the salt is dissolved in water to saturation, which requires about three pounds of salt to a gallon of water; and ale grounds, or the cheapest kind of flour, such as that of beans, is mixed with the liquid to bring it to the consistence of thick cream. The use of the flour or grounds is chiefly to enable the files to retain a greater quantity of salt, which fuses, and forms a protecting varnish when in the fire; for, as Dr. Ure observes, the carbonaceous matter of vegetable substances does not combine with iron with sufficient facility to produce any effect during the brief application of heat in hardening. Animal carbon, applied in the way above described, forms a very desirable addition to the mixture for all files intended to be very hard, especially for saw-files. The heating is usually effected in an open fire of clean cokes, the file, if small, being held by the tang end in a pair of tongs, and frequently withdrawn, to see that no part becomes over-heated. The proper temperature is indicated by a cherry-red colour. A kind of oven is sometimes used for large files, to facilitate the uniform application of heat, the oven being formed of fire-bricks, open at one end to receive the files and fuel, and the fire being urged by bellows. Some file-makers put sulphuric acid or other substances into the quenching-water, with a view to procuring the greatest possible hardness; but Dr. Ure thinks that 'clear spring water, free from animal and vegetable matter, and as cold as possible, is the best calculated for hardening files of every description.' All files should be immersed quickly; those of a flat, square, triangular, or round form, being plunged perpendicularly into the water, while the half-round, though kept perpendicular, should be moved a little horizontally in the direction of the round side, to prevent its becoming crooked. With every precaution the files are liable to take some degree of warp or curvature in this process, to remove which they are withdrawn from the water before they become quite cold, 'and being placed, the point under a staple and the middle across some competent support, the workman leans with his weight upon the opposite or tang end, meanwhile ladling the water with his hand upon the superior surface.' 'By this means,' observes Holland, whose account we have quoted, 'a degree of crookedness amounting in some cases to almost a quarter of an inch in a foot, is effectually reduced; and what appears most remarkable in this manipulation is, that the file in this only partially cooled but absolutely hardened state never breaks under a stress more than fifty times sufficient to snap it when cold.' 'This phefloating impurities, the chemical combination of the saline constituents of sea-water would probably, as he apprehends, render it ineffectual for the intended purpose. He likewise represents a kind of filter, which is also alluded to by Dr. Ure, in which the filtration is carried on without any exposure to the access of air; both the vessel into which the impure fluid is put, and that which receives it after filtration, being hermetically closed. These two vessels are connected together by a small air-pipe, through which the air displaced from the lower vessel by the dropping of the fluid into it ascends into the upper vessel to occupy the space which it has just vacated. The process therefore is conducted without the contact of any more air than the vessels contain at its commencement, and without the escape of any vapours from the fluid; so that the most volatile liquids may be filtered without loss, and the injurious effects which in other cases might arise from the free admission of air are avoided.

FINIGUERRA. [ENGRAVING, P. C., p. 438.]

FIORILLO, JOHANN DOMINIK, a distinguished German painter and author, was born at Hamburg in 1748. He went to Rome in 1761, and was for four years the pupil of Pompeo Batoni; he studied also some time at Bologna, where he was elected a member of the academy in 1769. In 1784 he was appointed to the professorship of art in the university of Göttingen, where he died in 1821. He is the author of several essays relative to the history of modern art, but his great work is his history of painting, comprising the 'Geschichte der Mahlerey' (History of Painting) in Italy, France, Spain, and England, in five volumes, and the 'Geschichte der Zeichnenden Künste in Deutchland und den Vereinigten Niederlanden' (History of the Arts of Design in Germany and the United Netherlands), in four volumes, 8vo. The whole forms a very useful compilation; but he has introduced notices of so many artists of utter historical insignificance, that he has not been able to give sufficient space to the important artists, and the first five volumes are a mere chronological series of short biographies, but they contain much interesting matter of the latter centuries of the middle ages. The German portion is a work of great research, merit, and utility, especially where he treats of early times.

Fiorillo painted to the last, but he did not execute many pictures: his master-piece is considered a large picture of 'The surrender of Briseis to the Heralds of Agamemnon,' from Homer.

(Meusel, *Miscellaneen Artistischen Inhalts;* Nagler, *Künstler-lexicon.*)

FIRE-BOTE. [ESTOVERS, P. C.; COMMON, RIGHT OF, P. C.]

FIRE-PROOF BUILDINGS. The most obvious method of rendering houses and other buildings indestructible by fire, is to construct them entirely of incombustible materials, such as stone, brick, and iron, to the exclusion of timber, at least in the framing and floors. Such a mode of construction, however, though very well adapted for some classes of public buildings, where cost of construction is not an object, and where domestic comforts and conveniences are not required, is of very limited application. The use of iron, and especially of cast-iron, in buildings, has indeed increased very much, and many plans for the construction of dwelling-houses almost entirely of that material have been brought forward, although the great advantages which they promise have not succeeded in dissipating the popular prejudices which oppose the introduction of so startling a novelty. It was stated in the 'Mining Journal,' in 1842, in a paragraph quoted in No. 665 of the 'Penny Magazine,' that a large number of cast-iron houses were then about to be manufactured in Belgium and England for the citizens of Hamburg, whose habitations had been burnt in May of that year; and it was remarked that, as the walls of such houses would be hollow, they might be easily warmed by a single stove placed in the kitchen. A three-story house, containing ten or twelve rooms, it is observed, will not cost more than 1100*l.*, regard being had to the manner in which it may be ornamented; and a house of this description may be taken to pieces and transported from one place to another at a very moderate expense.

Nicholson, in his 'Architectural Dictionary,' dismisses the subject of Fire-Proof Houses in very few words. He says, that in their construction, vaulted or cast-iron floors and roofs should be employed in every apartment, and observes, that while vaulting is well adapted to the lower story of a building, if it be used in the upper stories the walling must be carried up very thick, in order to resist the thrust of the arches, and this extra substance not only darkens the apartments, but also occasions enormous expense. The
venient substitute, he says, is a floor sustained b
joists, the intermediate spaces between which
vaulted with brick, or covered with cast-iron boar
and keyed together. A much fuller account of va
of fire-proof construction is given in Hebert's '
and Mechanic's Encyclopædia,' article 'Fires, Pre
These and some others we may briefly notice
classes, the first, consisting of plans for the use o
materials in lieu of timber; and the second, of
rendering timber itself incombustible.

Brickwork forms in this country the chief mate
external walls of houses, and [BUILDING, P. C. S.,
is occasionally employed without any admixture of
the partition walls also, a plan which, in conjun
other precautions, tends greatly to limit the damag
a fire to the apartment in which it may happen to
To render brick partitions available for this purpose
iron must be employed instead of timber for beams
summers, to support such walls as may have larg
beneath them (unless they are supported by arches
for any pillars employed to sustain such beams.
pillars and brest-summers are very extensively e
this way in modern London shops and warehouses,
whole front on the ground floor is left open for sho
and doors. When the floors and other parts of a b
to be constructed of timber, and protected by
means as are indicated below, it will in most case
able to use only incombustible materials in suc
parts of the skeleton or carcase of a house. Fire-
of the character alluded to by Nicholson are
adopted, not only in public buildings, but also in
and better sort of private houses; the beams bein
cast or wrought-iron, shaped transversely, somew
inverted T, and the brick vaultings, which abu
ledges of the beams, being often only half a bric
inches and a half thick, carefully turned in cem
beams may be connected with one another by w
tie-rods, to prevent any lateral thrust on the wall
spandrils, which, owing to the flatness of the arc
very trifling depth, being filled up with concrete
produce a solid level surface, upon which a flag or
ment, or a floor of cement, may be laid. In pri
it is usual to surmount the vaulting by a floor of
ported by the iron beams or ribs, which, in some
as high as the crown of the arches. [FLOOR, P. C

In Farrow's patent method of fire-proof building,
by Hebert, the floors are supported upon joists of
iron, formed with a lateral projecting flange on
upon which are laid, stretching from joist to joist,
flat stones from two inches to two inches and a half
upper surfaces of which lie flush with the upper
the joists. These produce a level stone floor, inte
iron, which may either be used as such or be co
planks. The ends of the joists are turned down a
bond stone laid upon the walls, and cemented or
lead, which mode of fastening, combined with the
the superincumbent walls, prevents the joists fro
and consequently enables them, though slender,
enormous weight. The advantages of such a mod
struction may be seen from the experiments of M
noticed under TRUSSING, P. C., p. 319, so far as th
of the floor is concerned; but it is further advanta
means of tying the walls together. When it is in
cover the floor with boards, provision may readily
for securing them down in their place, and dowel
together, without any nails or visible fastenings. T
surface of the stones may be *stabbed* or made roug
plaster may be applied immediately to it without
vention of laths. A floor thus formed occupies a
from four to five inches only. Such floors have bee
fully adopted in some sugar-refineries, and other
peculiarly exposed to accidents by fire. The same
tion is applicable to roofs, and the patentee conside
roof so constructed, and covered with mastic, is the
roof ever invented, in addition to the combined adva
being fire, air, and water proof.

Mr. Frost, another of the experimentalists on
building, has invented a mode of constructing floors
of hollow square earthenware tubes, laid in strata
each other in direction, and united with cement in su
that the whole floor becomes one solid flag-stone. Th
however is said to be not one-fifth that of stone,

gth is asserted to be equal to that of timber. The tubes nade of brick earth, carefully prepared by machinery; he cement, which also affords a convenient substance for cting various parts of a building from the action of fire, sts of chalk mixed with about thirty per cent. of clay, being ground in water, and the finer portions floated off reservoir. The moisture is drained off, the residuum red to evaporate to dryness, and afterwards broken up, t in a kiln, ground to powder, and packed in casks ready se. Another mode of constructing fire-proof floors and , employed in the building of Buckingham Palace, but nted long before, and first used at Lord Thurlow's seat at ght's Hill, near Dulwich, consists in the use of arches posed of hollow earthen coombs or pots, springing from e abutments resting upon the flanges of iron girders. spandrils, in a roof constructed on this plan, are filled up brickwork, so as to form a level surface, which is covered hot cement composed of chalk, coal-tar, and sand. The coat of cement is levelled with heated irons, and suffered arden, after which a second coat is laid, and slates are edded in it before it cools. The use of earthen pots in ding, as may be seen by referring to Circus, P. C., 197, 199, was known to the Romans. Fire-proof roofs perhaps, in ordinary buildings, less important than fire- floors; but they are easily constructed in various other s than those above indicated, by the use of iron framing some light metallic covering. The staircase, although it e of the most important parts to secure from fire, is too one of the chief means of communicating it from one of a house to another. Wherever the expense can be e, a stone staircase, with a metallic balustrade or hand- or, under certain circumstances, a staircase formed entirely n, is highly desirable as a means of security against fire.

e cheapness of timber, the facility with which it may be ed into any required shape, and the ideas of domestic rt connected with the use of wood for floors and other of a house, combine to render very important any method hich it may be rendered incombustible. Solutions of ate of ammonia, muriate of soda (common salt), sal-am- ac, borax, alum, and several other salts and alkalies, with wood may be impregnated, or which may be applied surface, possess this quality in a limited degree; and ayne's wood-preserving process [Timber, Preserva- or, P. C. S.], timber is made, for all practical purposes, letely incombustible. It may also be rendered almost ailable by fire, by simply preventing the passage of air gh its joints, or by covering it with some substance h is a bad conductor of heat. In the first of two papers e prevention and extinction of fires, published in the ny Magazine' in 1840 (Nos. 531 and 532), it is stated early in the last century Dr. Hales communicated to the l Society a method of checking the spread of fires by on-conducting properties of earth or sand, with which roposed to cover such parts as might, during a fire, be in er of igniting. He found by experiment that a layer of mould one inch thick, spread upon a fir plank of about that thickness, was sufficient to prevent the plank from burnt through in less than two hours by a fierce fire ed upon the earth, and continually urged by bellows; even when the wood was at length ignited, it burned out flame. About seventy-five years ago Mr. Hartley ght forward a plan for protecting buildings from fire by ng thin plates of iron to the tops of the joists, beneath flooring-boards, and in other places, in order to prevent communication of flame from one part to another of the r-work of a house; and about the same time Earl Stan- introduced another method of accomplishing the same t. 'He proposed,' according to the paper above referred to fix oak or fir laths crosswise between the joists, and to the whole, both joists and laths, with a thick layer of er: this plaster was composed of one measure of common sand, two of slacked lime, and three of chopped hay, with water and beaten up into a stiff mortar. A layer d was placed on the plaster which covered the joists and and when the plaster and sand were quite dry, the g-boards were to be laid down.' Both Mr. Hartley arl Stanhope made several satisfactory experiments to the efficacy of their plans, yet neither of them was ed to any extent.

ny similar attempts have been since made to force this tant matter on public attention. Among the plans thus uced Hebert mentions one which has been occasionally ed in Edinburgh, of laying wooden floors with planks two and a half or three inches thick, so closely jointed and neatly fitted to the walls as to be practically air-tight. Some similar floors constructed at Manchester have the planks ploughed on the edges to receive thin iron tongues, which enter some distance into each board. Such floors, laid upon iron joists, would be very difficult to ignite, either from above or below, especially if the ceilings beneath them were formed of a composition more fire-proof than the common plaster. Professor Fuchs, of the Academy of Science at Munich, invented a composition consisting of ten parts potass or soda, fifteen parts fine silicious earth, and one part charcoal, mixed together with water, which, when applied to the surface of wood, forms a vitreous coat, capable of effectually resisting the action of fire. Hebert states that after some decisive experiments had established the efficacy of this plan, the Royal Theatre of Munich was protected with this composition. The surface covered was upwards of 400,000 square feet, and the expense is said not to have exceeded 5000 francs, or about 200*l.* He gives also the following English composition for the like purpose, which is said to form a very strong and adhesive coating, both fire and water proof:—one part, by measure, of fine sand, two parts wood-ashes, and three parts slacked lime, ground together in oil, and laid on with a painter's brush, the first coat thin, and the second thick. Within the last few years a company has been formed for bringing into use a kind of fire-proof cement or composition similar to the above, invented by Mr. Davies. Among several public experiments which have been made to prove its efficiency is one which is thus noticed in the paper above quoted from the 'Penny Magazine':—'A house, or rather the shell of a house, was purchased near London, and the whole of the timbers, floors, ceilings, stairs, and other portions of woodwork were completely coated with a certain composition. When this was dried, some of the rooms were furnished with the common articles of domestic furniture, small in value, but of the usual nature as to combustibility, &c. A large quantity of shavings and pieces of wood were strewed on the floors of the several rooms; and on a given day each room was set on fire. Every article in each room was completely consumed; but in no case did the fire penetrate to the woodwork of the room, or pass from one room to another: some gunpowder was placed between the ceiling of one room and the floor of the one above it; but neither the fire above nor that beneath had any effect on the gunpowder.'

We may close this article with the concluding remarks of the paper above quoted, that public attention is now so much directed to this subject 'that we may fairly expect the time to be not far distant when the principle of fire-prevention will form part of the system by which most houses will be built;' and that 'until this is done, we may look for the repetition of the same kind of distressing calamity by fire which so often comes before the public eye.'

FIRE-SHIP is a vessel laden with combustible materials, which is sent, or left, in a burning state among the ships of a hostile fleet for the purpose of setting them on fire.

The Greek fire, which is said to have been discovered by a Byzantine engineer in the seventh century, appears to have been employed for the destruction of ships in naval actions, also for dispersing troops in engagements on land, and for setting fire to houses in besieged towns. It is supposed to have been a composition of sulphur, bitumen, and naphtha, which, being contained in an earthen vessel, was thrown by the hand or projected from some engine. The writers in the time of the crusades describe the missile as resembling a great dragon flying through the air with a stream of fire issuing from its mouth, and they add that water thrown on it only made it burn more fiercely; it could be extinguished however by pouring on it vinegar, and covering it with sand.

But a fire-ship of the nature above defined began to be employed at a much later period; one such was contrived by Giambelli, an Italian engineer; and this 'infernal machine,' as it was designated, was employed in 1585 to destroy the bridge laid across the Schelde when Antwerp was besieged by the Prince of Parma (Strada, *De Bello Belgico*, decas secunda, lib. vi.): three years afterwards the Spanish armada, while at anchor off Calais, was dispersed by eight fire-ships which the English admiral sent against it. Fire-ships were also used by the English and Dutch at the sieges of St. Malo, Hâvre-de-Grace, and Dunkirk, in the reign of William III., but none of these appear to have succeeded. One of these ships is described as having the lower hold filled with sand, above which were barrels containing in all 20,000 pounds of powder; over these were laid a bed of stones and a quantity of loaded

shells and carcasses: these were also covered with stones, and above the latter were barrels containing wood and tar.

In fire-ships of the most recent construction there is formed between decks, on both sides, a stage four feet wide, consisting of timbers four inches square, disposed horizontally with intervals between them equal to their breadth: these timbers are attached at one end to the ship's sides, and at the other they rest on a longitudinal timber supported on props which are set up at intervals along the ship. On this stage is a groove six inches wide and three inches deep, which goes quite round the ship; and timbers, in which are similar grooves, extend at intervals across it: these grooves contain the hose carrying the powder by which fire is to be communicated to the materials; and when the hose is placed in them, they are covered with planks.

The stage is entirely covered with a tarpauline on which is strewed loose powder, and on this are placed the combustible materials. These consist of faggots of wood and bundles of hemp steeped in a mixture of resin, turpentine, saltpetre, and mealed gunpowder; billets of wood dipped in saltpetre and pitch; casks filled with chips of wood mixed with pitch and turpentine; and among these are distributed loaded shells and carcasses. Faggots soaked in pitch are also fastened to the sides of the ship and are bound with copper wire about the props supporting the stage; and previously to lighting the fire the ports are opened, in order that the combustion may be increased by a current of air between decks.

The bowsprit and the ends of the yards are furnished with grappling-irons, which are suspended by ropes, in order that by swinging about they may take hold of the hulls or rigging of the ships to be destroyed.

A fire-grate is fixed near the stern; and when the commander has brought his ship in contact with one of those which belong to the enemy, he orders the crew to pass through a port in the stern into a boat which is provided for the purpose: he then puts fire to the wood in the grate; and, as soon as he has ascertained that the train of powder has begun to burn he quits the ship: the boat is then rowed off as fast as possible.

Fire-ships can only, with a prospect of success, be sent among such as, in an action, have been dismasted or otherwise rendered incapable of manœuvring; or among ships in a port, which consequently are unable, from want of room, to avoid the danger. It was thus the Turkish fleet, having been defeated by the Russians, was entirely destroyed by fire-ships sent into it, while at anchor in the bay of Tchesmé, in which it had taken shelter. Fire-ships are now, however, seldom used in warfare; and perhaps they ought only to be sent against ships which refuse to strike, after having been rendered incapable of continuing the action.

FIRENZUO'LA, A'GNOLO, was born September 28, 1493, in the city of Firenze (Florence). He was christened Michelagnolo Girolamo, but his name was afterwards contracted to Agnolo (Angelo). The family name was taken from the small town of Firenzuola, in Tuscany, between Florence and Bologna, in a valley among the Apennines, near the source of the Santerno. Negri, Niceron, and others who have followed them, appear to have been mistaken in stating that the family name was Nannini. Agnolo's father, Bastiano Giovannini da Firenzuola, and his grandfather Carlo da Firenzuola, were citizens of Firenze, and both of them held offices of trust in the city under the patronage of Cosmo de' Medici.

Agnolo Firenzuola lived in his native city devoted to the study of elegant literature till the age of sixteen, when he

him 'Il Reverendo Abate Messer Agnolo Fire
addressing himself to Pandolfo Pucci, speaks of A
'caro e virtuoso amico' (his dear and virtuous fri

His works were published in 1548, as ai
partly by Lorenzo Scala and partly by Carlo
Agnolo's brother: they consist of 'Discorsi deg
'Ragionamenti;' 'Novelle;' 'Epistola in Lode
'Dialogo delle Bellezze delle Donne;' 'Discacci
Nuove Lettere;' two comedies, 'I Lucidi' and 'L
'Asino d'Oro d'Apulejo rifatto in Lingua Fio
'Rime.'

Firenzuola is entitled to a high place amo
Italian writers. His works have been frequent
both separately and collectively, and are stil
His two comedies, regarded merely as specimens
dialogue, are not surpassed by anything in the la
has less power and originality of imagination t
Machiavelli, and Divizio (Cardinal Bibbiena),
ately preceded him, and Gelli, who was his c
but his dialogue is always natural, spirited, app
characters, and in purity of idiomatic Tuscan is e
any other Italian author. He is one of the 'te
or writers of the highest authority in the lan
such is frequently quoted in the 'Vocabolario' of
della Crusca. 'I Lucidi' is an adaptation of the
of Plautus, but the plot of 'La Trinuzia' (Tri
appears to have been invented by himself, e
character of Rovino seems to have been mode
Calandro, in the 'Calandria,' of Cardinal Bibl
zuola's two plays are free from the indecencies
his 'Novelle.' They are printed in the sec
Biagioli's collection of Italian classic writers, '
Lingua Toscana,' Paris, 8vo., 1822, with c
French explanatory of the difficult idioms.

The 'Novelle,' of which there are ten, are
the manner of Boccaccio, inferior in invention
descriptive power, but of equal elegance of
dialogue; some of them however are little less
many of those of Boccaccio himself.

Firenzuola's version of the 'Golden Ass'
partly adapted and partly translated. The ti
from the 2nd century to the 15th; the Greek
verted into Italian towns, and the Lucius of th
becomes Agnolo in the version. The leading
are retained, but altered as far as is necessa
change of time and country; the alteration h
means an improvement of the original narrati
composition, as a specimen of Italian prose, is

Firenzuola's other prose works, which are
form of dialogue, are delightfully written; his
Bellezze delle Donne' especially, abounds in
exceeding delicacy, conveyed in a style s
flowing, as to give to a series of remarks all t
an interesting narrative. The 'Discacciamento
opposition to the party who were then attempti
certain letters not previously in use into the Fi
bet, such as the letter K. Firenzuola, in a so
the literary reformers as 'kandidi ingegni.'

As a writer of verse Firenzuola has consider
sonnets, indeed, are less delicate in thought
than those of Petrarch, but his satirical verse
class, very effective, and in elegance and facil
rior to those of Berni.

(*Vita di Agnolo Firenzuola*, prefixed to h
6 vols. 18mo., 1816; Ginguené, in *Biographi*

rles VI. He was born in 1680, but the year
not known, though it was after 1740. He was
oduce the steam-engine into Germany. There
iese architects and their works in the Austrian
yclopädie' of 1835, ii. 147.

KÄRL VON, founder of the Munich school
e, was born at Mannheim, September 19,
the age of fourteen was placed by his father,
'ischer, who had observed in him an unusual
drawing, especially for drawing buildings,
director Verschaffelt, a man of great ability
ion. On Verschaffelt's removing to Vienna
e of being employed by Prince Esterhazy,
npanied him thither, and remained in that
801 to 1806; and besides the advantage he
studying there at the Academy of Fine Arts,
practical experience, being intrusted by Ver-
he superintendence of some of the buildings he
pon. It was while he was at Vienna that he
what afterwards became his greatest work, for,
designs for an opera-house, and also for another
excited much admiration, he was commissioned
plan of the latter so as to adapt it for the new
' which it was intended to erect at Munich.
however was dropped for a time: so, on quit-
Fischer visited France first, afterwards Italy,
r country he spent about two years, diligently
he most remarkable examples of architecture,
e buildings or particular features of them,
ing himself with a valuable collection of lessons
al composition and detail. On his return to
809, he went to Munich, where he was made
rchitecture at the Academy, of which office he
to the time of his death, to discharge the duties
l and ability, being most earnest and anxious
the advancement of the students. He afforded
ess to all his own drawings and books (after-
sed for the Academy at his death); and it was in
f his strongly urging it, that the Academy began
ection of architectural casts and models.

first buildings erected by him at Munich was
or the minister Salabert, at the entrance to the
den,' which was afterwards occupied by Prince
en called the 'Pavillon Royal.' When the
z and Maximilian Vorstadt were first laid out in
fourteen of the principal mansions and houses in
ntroducing a nobler style of architecture than had
employed in constructions of that class. Among
residences and hotels by him, the most remarkable
he then Crown-Prince of Bavaria, Baron von As-
Pappenheim, and Baron von Zentner. The façade
terial-gebäude des Innern,' or Home-office;—the
and General Hospital were also by him. All
r were but minor works in comparison with the
,' which is still one of the principal ornaments of
ugh numerous other stately edifices have been
the city. This magnificent theatre was begun
first opened Oct. 12th, 1818, but within a short
stined to the fate which has proved destructive to
tures of the kind, it having been nearly consumed
23: it was however begun to be rebuilt the fol-
according to the original designs. Plans, sections,
rawings, fully illustrating this edifice, may be
ster's 'Bauzeitung' for 1841; and the dimensions
re and stage are stated in the Table, page 299,
C. Noble as is the order of the portico—a
ctastyle, whose columns are 52 Bavarian or 49
high—the portico itself (merely a monoprostyle)
ns satisfactory as a whole, the wall behind the
g pierced by two tiers of windows—a most un-
f fenestration and columniation, the former quite
e classical character so ambitiously aimed at by
Fischer did not live to learn the fate of the
red by himself, as he died, after several months'
ng from a pulmonary disorder, Feb. 11th, 1820;
ther (then 73 years old), and a wife, and young
egret his loss; and not them alone, but a nume-
' of pupils, sincerely attached to so excellent an
Several of these have since greatly distinguished
especially Friedrich von Gärtner of Munich,
t to the King of Bavaria.

FOSSIL. For the successful investigation of
s specimens of fishes, generally imperfect, and difficult of interpretation, which occur in the various stratified rocks, we are almost wholly indebted to one naturalist. It is to M. Agassiz, following in the footsteps of Cuvier, that we owe the remarkable progress which has been made in this branch of Palæontology. The systematic thread by which this author has cleared away the obscurity of the subject of fossil fishes is already explained in the article ICHTHYOLOGY, P. C., and we propose here to give an enumeration of the genera and their geological distribution, as far as relates to the British Islands. The list is compiled from the reports of M. Agassiz to the British Association in the years 1843 and 1844. The geological classification is that developed in the Cyclopædia, articles PALÆOZOIC SERIES and SALIFEROUS SYSTEM.

TABLE I.—*General Distribution of the orders of Fossil Fishes.*

	Placoid.	Ganoid.	Ctenoid.	Cycloid.
Cainozoic Strata	*	*	*	*
Mesozoic Strata	*	*	*	*
Palæozoic Strata	*	*		

Hence it appears that the two orders of Ctenoid and Cycloid fishes, which are the most abundant in existing nature, have no representatives yet discovered in the Palæozoic strata.

If we divide the two groups of Mesozoic and Palæozoic strata into their constituent parts we shall have additional results.

TABLE II.—*Distribution of the orders of Fossil Fishes in Mesozoic and Palæozoic Strata.*

	Placoid.	Ganoid.	Ctenoid.	Cycloid.
MESOZOIC:				
Upper	*	*	*	*
Middle	*	*		
Lower	*	*		
PALÆOZOIC:				
Upper	*	*		
Middle	*	*		
Lower	*			

Hence it would appear that the Placoid fishes (Onchus, &c.) are, geologically speaking, the most antient of the finny races; that the Ganoid fishes, Hŏloptychius, &c. begin in the middle Palæozoic series, and the Ctenoid and Cycloid only in the upper Mesozoic (Cretaceous) group. It is however very possible that this last statement may be modified by further research in the oolites. At present the distribution of Ctenoid and Cycloid fishes in the chalk is thought to favour the notion of the almost Cainozoic character of that deposit.

In the next four Tables (Tables III., IV., V., VI.) we give the geological distribution of the several families (some are merely provisional) under which M. Agassiz has ranged the British Fossil Placoid fishes.

TABLE III.—*Distribution of the Families of Placoid Fishes.*

	Ichthyodorulites.	Cestraciontes.	Hybodontes.	Squalides.	Raies.	Chimerides.	
CAINOZOIC:							
Upper	*	—	—	*	*	—	
Middle	—	—	—	—	—	—	
Lower	*	—	—	*	*	*	Period of greatest abundance.
MESOZOIC:							
Upper	*	*	—	*	—	*	
Middle	*	*	*	*	*	*	
Lower	*	—	—	—	—	—	
PALÆOZOIC:							
Upper	*	*	*	*	—	—	
Middle	*	*	—	—	—	—	
Lower	*	—	—	—	—	—	

Hence the most prolific periods for Placoid fishes seem to be the upper Palæozoic, the middle and upper Mesozoic, and the lower Cainozoic strata.

Table IV.—*Distribution of the Families of Ganoid Fishes.*

	Lepidoides.	Sauroides.	Cœlacanthes.	Pycnodontes.	Acipenserides	Sclerodermes.	
Cainozoic:							
Upper .	—	—	—	—	—	—	
Middle .	—	—	—	—	—	—	
Lower .	—	—	—	*	*	—	Period of abundance.
Mesozoic:							
Upper .	*	*	*	*	—	*	
Middle .	*	*	*	*	*	—	
Lower .	*	*					
Palæozoic:							
Upper .	*	*	*	—	—	—	
Middle .	*	*	*	—	—	—	
Lower .	—	—	—	—	—	—	

The Ganoid fishes (singular forms, however) begin to abound in the middle Palæozoic series, and become rare above the lower Cainozoic series. They are also rare in existing nature. M. Agassiz once included the Glyptocephalus of Sheppey among the Ganoids, but in his later catalogue he has joined it to the Cycloids.

Table V.—*Distribution of the Families of Ctenoid Fishes.*

	Percoides.	Sparoides.	Teuthies.	Chetodontes.
Cainozoic:				
Upper . . .	—	—	—	*
Middle . . .	—	—	—	—
Lower . . .	*	*	*	—
Mesozoic:				
Upper . . .	*	—	—	—
Middle . . .	—	—	—	—
Lower . . .	—	—	—	—
Palæozoic:				
Upper . . .	—	—	—	—
Middle . . .	—	—	—	—
Lower . . .	—	—	—	—

The account of the Ctenoid fishes in the lower Cainozoic strata is from the report of M. Agassiz to the British Association in 1844.

Table VI.—*Distribution of the Families of Cycloid Fishes.*

	Acanthopterygians.					Malacopterygians.						
	Scomberoides.	Xiphioides.	Sphyrænoides.	Labroides.	Blennioides.	Scomberesoces.	Clupeides.	Characins.	Gadoides.	Anguilliformes.	Doubtful.	Undetermined.
Cainozoic:												
Upper .	—	—	—	—	—	—	—	—	—	—	—	—
Middle .	—	—	—	—	—	—	—	—	—	—	—	—
Lower .	*	*	*	*	*	*	*	*	*	*	*	*
Mesozoic:												
Upper .	—	*	—	—	—	*	—	—	—	—	—	*
Middle .	—	—	—	—	—	—	—	—	—	—	—	—
Lower .	—	—	—	—	—	—	—	—	—	—	—	—
Palæozoic:												
Upper .	—	—	—	—	—	—	—	—	—	—	—	—
Middle .	—	—	—	—	—	—	—	—	—	—	—	—
Lower .	—	—	—	—	—	—	—	—	—	—	—	—

To complete this view of the geological distribution of fossil fishes, we append an abstract of the catalogues of *M. Agassiz*, which have been already referred to.

Silurian System.

PLACOID FISHES.

Ichthyodorulites.

Onchus, two species.

Family unknown:

Thelodus, one species
Sclerodus, one species
Plectrodus, two species
Sphagodus, one species
Pterygotus, one species. (This is probably a crustacean.)

Devonian System.

PLACOID FISHES.

Ichthyodorulites.

Onchus, two species
Parexus, one species
Ctenacanthus, one species
Ptychacanthus, one species
Clematius, one species.

Cestraciontes.

Ctenoptychius, one species.

GANOID FISHES.

Lepidoides.

Dipterus, one species
Osteolepis, four species
Acanthodes, one species
Diplacanthus, four species
Cheiracanthus, three species
Cheirolepis, three species
Cephalaspis, four species
Pterichthys, eight species
Coccosteus, three species
Chelonichthys, two species.

Sauroides.

Diplopterus, three species
Platygnathus, three species
Dendrodus, three species
Lamnodus, two species
Cricodus, one species
Megalichthys, one species.

Cœlacanthes.

Holoptychius, five species
Glyptosteus, two species
Phyllolepis, one species
Glyptolepis, two species.

Carboniferous System.

PLACOID FISHES.

Ichthyodorulites.

Onchus, six species
Ctenacanthus, six species
Ptychacanthus, one species
Sphenacanthus, one species
Asteroptychius, two species
Physonemus, one species
Gyracanthus, four species
Oracanthus, four species
Leptacanthus, two species
Tristychius, one species
Cladacanthus, one species
Cricacanthus, one species
Orthacanthus, one species
Pleuracanthus, three species.

Cestraciontes.

Orodus, two species
Helodus, nine species
Chomatodus, three species
Cochliodus, five species
Psammodus, four species
Pœcilodus, six species
Pleurodus, two species
Ctenoptychius, eight species
Ctenodus, three species
Petalodus, eight species.

Hybodontes.

Cladodus, eight species
Diplodus, two species.

Squalides.

Carcharopsis, one species.

GANOID F

Lepidoid

Acanthodes, one s
Amblypterus, thr
Palæoniscus, six s
Eurynotus, two sp
Platysomus, one s
Plectrolepis, one s

Sauroide

Megalichthys, tw
Diplopterus, two s
Pygopterus, three
Acrolepis, one spe
Orognathus, one s
Graptolepis, one s
Pododus, one spe

Cœlacanth

Cœlacanthus, two
Holoptychius, eig
Hoplopygus, one s
Uronemus, one sp
Phyllolepis, one s

Permian S

PLACOID F

Ichthyodor

Gyropristis, one s

GANOID F

Lepidoid

Palæoniscus, five
Platysomus, three

Sauroid

Acrolepis. one sp
Pygopterus, two

Cœlacant

Cœlacanthus, one

Triassic S

PLACOID F

Ichthyodor

Hybodus, one spe
Nemacanthus, tw
Leiacanthus, one

Cestracio

Acrodus, one spe
Ceratodus, ten sp

Hybodon

Hybodus, one spe

GANOID F

Lepidoid

Gyrolepis, three
Palæoniscus, one

Sauroid

Saurichthys, thre
(N.B. Agassiz
Bone-bed at the
Lias in the Trias

Oolitic Sy

PLACOID F

Ichthyodor

Leptacanthus, thr
Nemacanthus, on
Myriacanthus, thr
Asteracanthus, fi
Hybodus, thirteen
Pristacanthus, one

Cestracion

Acrodus, eight sp
Ceratodus, one sp
Strophodus, six sp

Hybodont

Hybodus, ten spe
Sphenonchus, thre

Squalide

Thyellina, one sp
Oxyrhina, one spe

Raies.

Arthropterus, one

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CTENOID FISHES.

Percoides.

Beryx, three species.

CYCLOID FISHES.

Hypsodon, one species
Enchodus, one species
Saurocephalus, two species
Saurodon, one species
Tetrapterus, one species
Acrognathus, one species
Aulolepis, one species
Osmeroides, two species.

Tertiary System.

PLACOID FISHES.

Raies.

Myliobates, sixteen species
Zygobates, one (Crag.)
Aetobates, two species
Pristis, three species
Raia, one species.

Squalides.

Notidanus, one species
Glyphis, one species
Carcharodon, two species
Otodus, two species
Lamna, one (Crag.)

Chimerides.

Elasmodus, one species
Edaphodon, three species
Passalodon, one species
Psaliodus, one species.

GANOID FISHES.

Pycnodontes.

Pycnodus, one species
Periodus, one species
Gyrodus, one species
Phyllodus, six species
Pisodus, one species.

Acipenserides.

Acipenser, one species.

CTENOID FISHES.

Percoides.

Myripristis, one species
Cœloperca, one species
Eurygnathus, one species
Podocephalus, one species
Synophrys, one species
Brachygnathus, one species
Percostoma, one species.

Sparoides.

Sciænurus, two species.

Teuthies.

Ptychocephalus, one species
Pomaphractus, one species
Calopomus, one species.

CYCLOID (ACANTHOPTERYGIOUS) FISHES.

Scomberoides.

Cybium, one species
Cœlopoma, two species
Bothrosteus, three species
Phalacrus, one species
Rhonchus, one species
Echenus, one species
Scombrinus, one species
Cœlocephalus, one species
Naupygus, one species.

Xiphioides.

Tetrapterus, one species
Cœlorhynchus, two species
Phasganus, one species
Acestrus, one species.

Sphyrænoides.

Sphyrænodus, two species.

Labroides.

Auchenilabrus, one species.

Blennioides.

Laparus, one species.

CYCLOID (MALACOPTERYGIOUS) FISHES.

Scomberesoces.

Hypsodon, two species
Labrophagus, one species.

Clupeides.

Halecopsis, one species
Megalops, one species.

Characins.

Brychetus, one species.

Gadoides.

Rhinocephalus, one species
Merlinus, one species
Ampheristus, one species
Goniognathus, one species.

Anguilliformes.

Rhynchorhinus, one species

(Doubtful Family.)

Pachycephalus, one species
Rhipidolepis, one species
Glyptocephalus, one species
Gadopsis, one species
Loxostomus, one species.

NOTE.—In the preceding Lists the French titles of the families are retained, as given by Agassiz.

FISHES, *Geographical Distribution of.* [ICHTHYOLOGY, RECENT, P. C. S.]

FISTULA'RIA, a genus of Acanthopterygious fishes remarkable for the extreme elongation of the anterior part of the head, forming a tube, at the extremity of which is the mouth. The *Fistularia tabacaria* of the Antilles is the type. It lives on little fishes and crustacea, which it draws out from the interstices of stones and holes in rocks by means of its long trunk or beak. Two other species are known, the *F. serrata* and the *F. immaculata.* They are all small fishes, not reaching two feet in length, slender, and eel-shaped.

FIXTURES. The term 'fixtures' is frequently used to signify articles of a personal nature which have been affixed to land, whether removeable or not, and sometimes expressly to denote articles which are not by law removeable when once attached to the freehold; but the term 'fixtures,' in its correct legal sense, signifies such things of a personal nature as have been annexed to the realty, and which may be afterwards severed or removed by the party who annexed them, or his personal representatives, against the will of the owner of the freehold. When the article is not so removeable, it is to all intents and purposes part of the freehold, and subject to the rules and incidents of real property.

It is necessary, in order to constitute a fixture, that the article should be let into or united with the land, or to other substances previously connected therewith. Goods, and even buildings of the most ponderous description, do not fall under the description of fixtures, if they are merely laid and rest upon the earth without being let into it. Something more than mere juxta-position is required, as, for instance, that the soil shall have been displaced for the purpose of receiving the article, or that the chattel shall have been connected or otherwise fastened to some fabric previously attached to the ground.

The old rule of law was, that whatever was once fixed to the land was thereby made a part of it, so as to be irremoveable by any one but the owner of the fee-simple. But the strictness of this rule has been from time to time considerably relaxed, regard being had to the object of the annexation, the nature of the article, the relation of the parties between whom questions have arisen, and other considerations. Questions as to fixtures arise principally between three classes of persons. 1st, Between landlord and tenant; 2ndly, Between the executors of a tenant for life or in tail and the remainder-man or reversioner; and, 3rdly, Between the heir and the executor of the party who put up or attached the article to the premises.

1. As to the law of fixtures between landlord and tenant.

A tenant may in general remove articles which he has himself affixed to the premises solely for the purpose of trade and manufactures wherever the removal is not contrary to any prevailing custom of trade. It cannot however be said to be established that a tenant may remove substantial and permanent additions to his premises on the ground of their having been built exclusively for the purposes of his trade, such as workshops, storehouses, mills, or other buildings of that description; nor is it clear that trade-erections of a less substantial character, such as furnaces and flues of smelting or glass-houses, or the stories and floors of malting-houses, &c., are in all cases removeable by a tenant. In such cases, somewhat will depend upon the degree in which the freehold will be deteriorated by the removal of the article, or the article itself injured or destroyed before it can be taken away.

There are also instances in which articles which have been fixed to the freehold, partly for the purposes of trade and partly for other purposes, have been held removeable. Besides the above, many fixtures slightly put up for the ornament of a house or for domestic use may also be removed by the tenant.

But things attached to the freehold for agricultural purposes only are not removeable.

The following lists, given by Mr. Chitty, in his treatise on the Law of Contracts, p. 359, show what fixtures have been decided or considered, according to judicial dicta, to be removeable or not as between landlord and tenant.

1. List of things held not to be Removeable by the Tenant:—

Agricultural erections
Alehouse bar
Barns fixed in the ground
Beast-house
Benches
Box planted in garden
Bricks fixed with mortar
Carpenter's shop
Cart-house
Chimney-pieces (in general)
Conservatories
Cornices, if fixed substantially
Doors
Dressers
Flowers
Foldyard walls
Fruit trees
Fuel-house
Glass windows
Hearth
Hedges
Improvements, permanent
Jibs
Keys
Locks
Millstones
Partitions
Pigeon-house
Pineries substantially affixed
Pump-house
Racks in stables
Strawberry beds
Waggon-house
Windows.

2. List of things held to be Removeable by the Tenant (though not Trade Fixtures):—

Arras hangings
Barn on blocks
Beds fastened to ceiling
Bells
Bins
Blinds
Book-cases
Buildings on blocks
Rollers, pillars, &c.
Cabinets
Chimney backs
Chimney-pieces (ornamental)
Cider mills
Cisterns
Clock-cases
Coffee-mills
Cooling coppers
Coppers
Cornices, ornamental, fixed with screws only
Cupboards
Dutch barns
Furnaces
Furniture, fixtures put up as
Granary on pillars
Grates
Hangings
Iron backs to chimneys
Iron chests
Iron malt-mills
Iron ovens
Jacks
Lamps
Looking-glasses
Malt-mills
Marble chimney-pieces
Marble slabs
Mash-tubs
Mills on posts
Mills laid on brick foundations
Ornamental fixtures
Ovens
Pattens, erections on
Pier glasses
Posts
Presses
Pumps slightly attached
Rails
Ranges
Sheds
Shelves
Sinks
Slabs of marble
Stable on rollers
Stoves
Tapestry
Tubs
Turret clocks
Vessels, &c., on brickwork
Wainscot, fixed with screws
Water-tubs
Windmill on posts.

3. List of Trade Fixtures decided or said to be Removeable by the Tenant:—

Accessary buildings, that is, accessary to a removeable utensil
Brewing vessels and pipes
Cider-mills
Cisterns
Closets
Colliery machines
Coppers
Counters
Cranes
Desks
Drawers
Dutch barns
Engines
Fire-engines
Furnaces
Gas-pipes
Glass fronts
Iron safes
Machinery, let into caps or steps of timber
Partitions
Plants and pipes of brewers, distillers, &c.
Presses
Pumps
Reservoirs
Salt-pans
Shelves
Shrubs planted for sale
Soap works, fixtures in
Steam-engines
Stills
Trees planted for sale
Varnish-house
Vats.

There are also certain fixtures as to which the right of removal is unsettled, but has been the subject of discussion,
in determining some of the cases already referred
doubtful articles the subjoined is a list:—

Brick-kilns
Cornices
Frames in nursery grounds
Furnaces in smelting and glass-houses
Glasses in nursery grounds
Green-houses
Hot-houses
Lime-kilns
Malting-floors, sto
Pavements
Sheds
Storehouses
Tables, fixed or d
Verandas
Wind or water mi
Workshops.

It must not however be assumed that no circu
except the enumerated articles from the decisio
them. The particular circumstances of each cas,
or position of the fixtures in question, and the c
of the degree of injury to be caused by their rem
much regarded by the courts that few decisions
garded as absolute authorities for other cases, even
to fixtures of a similar description.

The general rule is, that a tenant must remove
before the expiration of his tenancy, for he is not
insist on his claim afterwards. But it seems tha
continue in possession after the end of the term,
the will of his landlord, he is entitled to remove
previously taken away. And if the interest of
of uncertain character, as of a tenant strictly a
autre vie, it is the common opinion that he will be
reasonable time after the determination of his tenan
his fixtures.

The rights both of landlord and tenant with re
tures are frequently modified and controlled by
the demise, according to the general principle
may, by entering into a special contract, vary their
with respect to each other. Thus, a covenant by
keep in repair all erections and buildings erecte
'and thereafter to be erected and built,' and to su
at the end of the term, will preclude him fro
erections put up by himself, and which, but for t
might have been legally removed as trade fi
therefore a tenant, before severing an article f
hold, must consider his right not only under the
of fixtures, but as it may be affected by any expre
covenant in his lease.

It should be observed that any erection or bu
ever be its purpose, and however substantial it
unless it be affixed to the freehold according to
of a fixture before given, will not belong to th
the end of the term. Thus, if the tenant er
granary, stable, or other building upon blocks, ro
or the like, the landlord will not be entitled to it
freehold. The tenant may therefore, by adopting
modes of construction, make many valuable add
premises without losing his property in them, and
time avoid the effect of a covenant to repair ere
are put up by him during the term.

2. As to the law of fixtures between tenant
in tail, or their personal representatives, and the re
or reversioner.

There are only few cases in which the claims
life or in tail to fixtures have come before the c
appears generally from the authorities, that fix
either wholly or partially for the purposes of tra
of the personal estate of a tenant for life or in
excepted out of the general rule in favour of the
and it may be inferred from the analogy of decis
between heir and executor, that the exception w
certain articles put up for ornament or convenien
they are not united to the freehold by any perm
stantial mode of annexation.

It is necessary to distinguish between the right
for life and in tail under the law of fixtures from
they possess under the general principles of tenur
to their estates. A tenant in tail, by reason of
his estate, may, independently of the law of fixt
anything he has affixed to the premises. A te
again, is not in general entitled to commit any ki
but if he holds his estate *without impeachment*
possesses powers arising out of his estate simila
the tenant in tail. [Waste, P. C.] But in eithe
powers must be exercised during the life of the te
cease at his death, and nothing survives to his re
except his right under the law of fixtures.

esiastical persons are considered as tenants for life of enefices, and the rights of such persons or their repre- es with respect to annexations made by them to the l resemble very nearly those of other tenants for life. s to the law of fixtures between heir and executor. e appears to be more uncertainty in the doctrine of as between the heir and the executor, than between er class of persons. In the early periods of the law, that whatever was affixed to the freehold should de- o the heir as parcel of his inheritance, was rigidly to, and even in later times the decisions and dicta of es upon the subject are by no means easy to reconcile. however be inferred from them generally, that as be- he heir and executor trade fixtures and fixtures erected or trade and partly for other purposes, are part of the l estate. This will be the case when the fixtures have t up for the purposes of a trade which is merely per- nd has no connection with the land, and even in some s that of Cider-mills (see 3 Atk. 14), where the trade ected with the profits of the land; but if the property ion is absolutely essential to the value and enjoyment of l, as was decided with respect to Salt-pans (1 H. Bl.,), it cannot be removed by the executor, but will de- o the heir as part of the inheritance. There are some put up for ornament or domestic use to which the r has been held entitled, such as pictures, mirrors, s, cornices, &c., where the degree of annexation is and the freehold will not be much deteriorated by the l.

questions with respect to fixtures, whether between d and tenant, tenant for life or in tail and the person l in remainder or reversion, or between heir and exe- much will frequently depend, not only upon the nature article, but also upon its construction, and the mode of exation to the freehold. The rule as to severance is ed most liberally in favour of the tenant as against the rd, not quite so strongly in favour of the tenant for life tail, as against the remainder-man or reversioner, and our of the heir rather than of the executor. This must s be remembered in drawing inferences from decisions en different parties. Thus a decision in favour of the tor against the heir may be relied on between whatever the question may arise, but decisions in favour of the against the landlord cannot be relied upon as conclusive s between other parties.

h respect to the transfer of fixtures the general rule is, conveyance or mortgage in general terms of lands and includes personal chattels attached thereto, though such s might otherwise have been removed under the law ures. When the conveyance is not general, but con- stipulation that 'the fixtures are to be taken at a valua- the question what fixtures are included (in the absence hedule or specification) is to be determined by the re- situation in which the parties are placed by the convey- If the conveyance be an absolute sale, then those articles hould be valued which would be fixtures as between heir xecutor; if there be a demise only, or the assignment ease, the valuation should extend to all that would be ered tenant's fixtures as between landlord and tenant. description of the premises in the renewal of a lease n the general terms, 'lands, buildings, erections,' &c., s are considered to be included in the demise, and the cannot afterwards remove them, whatever were his before the new lease was granted.

is now settled that contracts exclusively for the sale of s are valid without the formalities prescribed by the ection of the Statute of Frauds (29 Car. II. c. 3); though slightest interest in the realty be intended to pass, the e will apply. It would seem, too, that a contract for the f fixtures is not within the 17th section of the statute as ract for the sale of goods and chattels.

e the Treatise of Messrs. Amos and Ferard on the law tures.)

ABELLA'RIA, a generic title for some fossil plants, borassifolia, from the coal formation. (Sternberg.)

ACOURTIA'CEÆ, or **FLACOURTIA'NEÆ**, a na- order of plants belonging to Lindley's parietose group of etalous Exogens. It has from 4-7 definite sepals co- g slightly at the base, the petals equal in number with pals, and alternate with them, sometimes wanting; the ns hypogynous, equalling the petals, or twice as many or multiple of them, and sometimes appearing as scales ng a nectary; the ovary roundish, distinct, sessile, or slightly stalked; the style absent or filiform; the stigmas equal in number to the valves of the ovary, more or less distinct from each other; the fruit 1-celled, sometimes indehiscent and fleshy, sometimes capsular, 4-5-valved filled with a fine pulp inside; the seeds few, thick, usually enveloped in a pellicle formed by the withered pulp, the albumen fleshy, somewhat oily, the embryo straight in the axis, with the radicle turned to the hilum, and therefore usually superior; the cotyledons flat, foliaceous. This order consists of shrubs and small trees, with alternate simple coriaceous leaves on short stalks, and axillary many-flowered peduncles.

The affinities of this order are strongest with Capparidaceæ, with which they agree in a number of particulars. De Candolle says they approach Passifloraceæ by means of their parietal placentation and the presence of a series of barren stamina analogous to the corona of that order. Lindley indicates also a relation to Samydaceæ. They may however be distinguished from all other plants by their unilocular fruit having their inside wholly covered with the placentæ. About 13 small genera are referred to this order. Of these, three constitute Blume's order Pangiaceæ; but the plants composing it are little known at present.

These plants are natives of the hottest parts of the East and West Indies and Africa. Three of the genera, Flacourtia, Hydnocarpus, and Chaulmoogra, yield plants used by man; few, if any, are cultivated for ornament.

Flacourtia, the type of the order, was named in honour of Etienne de Flacourt, a director of the French East India Company, and the commander of an expedition to Madagascar in 1648, of which he gave an account. This genus is diœcious; the staminiferous flowers have their stamens densely crowded, an hemispherical receptacle, and are glandless at the base; the pistilliferous flowers have the calyx 4-5-cleft, deciduous; the stigmas 4-9, each furnished with a longitudinal furrow above; the seeds long. The species are thorny shrubs, with whiteish sepals and yellow stamens.

F. Ramontchi, has roundish ovate, acute crenated leaves. This shrub attains a height of eight feet, and is a native of the island of Madagascar, where it is called *Ramontchi*. The fruit, which is edible, is about the size of a small plum, is red when ripe, at length becoming violet-coloured. It has a sweet and acid taste. There is a small island off the coast of Madagascar which is covered with these trees. This island is called by English sailors Plum-tree Island; by the French, Isle aux Prunes.

F. sapida has elliptical leaves, serrated, bluntish at both extremities. It is a native of the mountainous districts of the East Indies. The fruit is about the size of a common currant, and of a red colour. The fruit is eaten by the natives, and the tree is called by the Telingese *Pedda Caurew*.

F. inermis has elliptical crenato-serrated leaves, with short axillary racemes of hermaphrodite flowers. It is an unarmed tree, attaining a height of 30 feet. It has reddish-purple berries of a pleasant acid taste. It is a native of the Moluccas, where it is also extensively cultivated for the sake of its fruit. There are several other species of Flacourtia, all of them yielding edible fruits.

Hydnocarpus (from ὕδνον, a tuber, and κάρπος, a fruit) has diœcious flowers, the staminiferous ones with 5 stamens, 5 sepals, the two outer ones being ovate, 5 petals with villous margins furnished with a scale on the inside; the berry is spherical, terminated by four reflexed tubercles. There is only one species of this genus, which is a tree about thirty feet in height, the *H. venenata* of Gærtner, and *H. inebrians* of Vahl. It is a native of Ceylon. The fruit when eaten produces sickness, giddiness, and a dangerous form of intoxication. It is greedily devoured by fishes, which become stupified, but when taken in this way they produce poisonous effects as food.

Chaulmoogra is a diœcious genus; the staminiferous flowers with a 4-5-lobed calyx, 5 petals with a scale at the base of each; the pistilliferous the same, except the stamens, the ovary superior, 1-celled, with numerous ovules, and 5 parietal placentæ, 5 styles; the fruit succulent, dry, 1-celled, many-seeded.

C. odorata has short-stalked, alternate, bifarious, drooping, lanceolate, entire, acuminate, smooth, exstipulate leaves, 6 to 10 inches long, 1½ to 2½ inches broad. It is a native of Silhet. The seeds are employed extensively by the natives of India as a remedy for cutaneous diseases. In those cases they are applied externally; the testa being removed from the seed, the perisperm is beaten up with clarified butter into a soft mass, and applied to the part affected three times a day. The Indian names of this plant are *Chaulmoogra* and *Petarkura*.

The other genera belonging to this order are *Ryanæa*, named by Vahl after John Ryan, who collected plants in Guyana; *Patrisia*, named after M. Patris, who collected plants in Guyana; *Roumea*, after Philippe Rose Roume de St. Laurent, an agent of the French government at St. Domingo, who was of great service to Poiteau, who travelled there; *Kiggelaria*, after Francis Kiggelar, a Dutch botanist of the seventeenth century; *Stigmarota*, *Melicytus*, *Erythrospermum*, *Pangium*, and *Vareca*.

(Don, *Gardener's Dictionary;* Lindley, *Natural System;* Lindley, *Flora Medica;* Burnett, *Outlines of Botany*.)

FLAGSTONE. A variety of sandstone, in which the laminated structure prevails, is thus termed. Other laminated or thin-bodied rocks, as certain limestones and some argillaceous beds of the Silurian series, receive the same title. The laminations of flagstone arise from peculiarity of *deposition;* the laminations of slate (properly so called) arise from a new structure superadded to that of deposition, and possessing a certain symmetry and relations to lines and axes, which are at least analogous to crystalline arrangements.

FLEET PRISON, the name of a metropolitan prison now abolished, so called from its being situated by the side of the river Fleet, now covered over. It was the prison to which persons were committed by the ecclesiastical courts, courts of equity, Exchequer, and Common Pleas. It was governed by an officer called the warden, who was responsible for the custody of his prisoners, and summarily answerable to the courts whose prisoners were sent there for any abuse of authority, extortion, or other misconduct.

The Fleet Prison was abolished by the 5 & 6 Vict. c. 22, which established the Queen's Prison (formerly the Queen's Bench Prison) as the only prison for debtors, bankrupts, and other persons who might formerly have been imprisoned in the Queen's Bench Prison, the Fleet Prison, or the Marshalsea Prison. The prison was pulled down in 1845.

FLEXIBILITY is a property of bodies by which they yield transversely, on the application of some power: this property is distinct from elasticity, as it does not necessarily follow that the bodies acted on recover their original figures when the power is removed.

Fibres of wool, silk, hair, and the like, possess this property in a high degree; rods of wood, metal, and stone are flexible, and those of the two last materials are more particularly so when heated. The property is so much the more sensible as the fibres or rods are longer.

The deflexions of beams or bars in vertical and in horizontal positions, when strained by weights, have been noticed in Materials, Strength of, P. C.; and the employment of the fibres of hemp and of iron or copper wire in the formation of ropes is explained under Ropes, P. C. Ropes made of metal are said to be even more flexible than those made of hemp, the capabilities of suspending weights being equal, and the former being, of course, less in circumference than the latter.

The mathematical theory for the vibrations which may take place in a thread which is perfectly flexible, when small forces are applied to all its points; and the investigation of formulæ for determining the position and velocities of the points at the end of a given time, may be seen in Poisson's *Traité de Mécanique*, No. 482, &c., edit. 1833.

FLEXURE OF COLUMNS. If the particles of which a column is composed were equal spheres in contact with each other and arranged in lines parallel to the axis of the column, a weight diffused uniformly over the top of the column, when the latter is in a vertical position, would probably produce no flexure: but if the particles be supposed to have any tendency to slide laterally, particularly if they are irregularly distributed so that they are over the intervals between others below them, it must follow, from the action of the weight at the top of the column, either that the particles thrust one another laterally outwards all round the axis, producing in the column a swell which is greatest in the middle of its length, or that, the compression of the particles being greater on one side than on another, the column is diminished in length, on the compressed side; the weight being thus made to act obliquely upon it, a general bend of the whole column in one direction is produced.

This effect takes place in pillars of iron, stone, and wood; and when the bend, which in a pillar of uniform dimensions is generally greatest in the middle, becomes considerable, a rupture takes place: sometimes the fracture across the column is a plane inclined to the axis; but often a swelling appears near the middle, on the concave side, and, at the instant of
rupture, a fragment in the form of a wedge is det
fibres of wooden pillars are generally of serpe
and they adhere together laterally with, comp
small force: hence, when such a pillar is compre
dinally by a weight, the latter acts obliquely on
and thus a pillar of wood becomes bent sooner than
of the other materials.

When a column is bent by a weight applied a
end, it is evident that, on the side which is conca
the particles extending to some distance within
must be in a state of compression, while those b
distance, towards the side which is convex outwar
in a state of tension; and, in any transverse se
column, the line on opposite sides of which the p
in opposite states is called the neutral line. The
this line in any section can only, at present, be dete
experiment.

Let AB be a vertical line passing through A in
of the upper extremity of a column bent by a
weight, and imagine *cd*, in any transverse section
(suppose in the middle of the column) to be a line
cutting the concave face in *a*; it is evident that,
if the column were incompressible, each of the
particles immediately above *ca*, which, by the
weight at A acting at *d*, the extremity of the lever
ad, is separated from a particle in *ca*, resists the
force of separation by its cohesive power acting at
the end of a lever whose length is the distance of
the particle from *a*, and the whole resistance
depends on the momenta of cohesion in all the
particles between *a* and *c*; whereas, the column
being compressible, and the neutral point being
somewhere, as at *b*, between *a* and *c*, it is evident
sistance of each particle to the action of the weight
on a lever whose length is the distance of the p
b, and the whole resistance, on the momenta
in the particles between *c* and *b*. Hence it is
the compressibility of a column must increase the
the column to be broken in consequence of the
duced by a weight placed upon it.

In Materials, Strength of, P. C., it is stated,
to the mathematical theory of elastic bodies co
the direction of their lengths, that the weights
columns will bear at the instant of beginning to

with $\frac{ad^2}{l^2}$, in which a is the area of a transverse se
depth and l its length; and, when the pillar is a soli
this expression may be transformed into $\frac{d^4}{l^2}$ (d re
the diameter). Also in Poisson's 'Traité de M
No. 315 (ed. 1833) it is shown that the force by
elastic hollow cylinder resists the tendency to fle
weight acting in the direction of its length is exp
formula which denotes that the force, or weight,
$\frac{d^4-d'^4}{l^2}$, in which d and d' are, respectively, the ext
interior diameters of the cylinder, and l its length
formulæ must be understood however as holding goo
columns which are incompressible; and, till lately,
periments for the determination of the actual str
columns were entirely wanting.

This desideratum is now supplied by the valuable
experiments carried on by Mr. Hodgkinson, and of
full account is given in the 'Philosophical Transac
1840 (Part II.). The columns, which were placed i
positions, were of various length, from a few inches
feet six inches, and all were subject to pressures ac
tically; some were cylindrical and others were re
prisms, and the former were either solid or hollow
cases the ends of the columns were planes perp
to the lengths, in order that the pressure might
fused uniformly over those ends; and, in the oth
ends were hemispherical, in order that the pressure
transmitted almost wholly in the direction of the
the experiments alluded to, a few only can be stat
but these, which are contained in the following ta
serve to give an indication of the relative strength of
columns when supporting weights, and of the inflexio
the columns experience.

No.	Nature of Column.	Material.	Forms of Ends.	Length in Inches.	Diameter, or Side, in Inches.	Weight in lbs. producing flexure.	Deflexion in middle, in dec. of in.	Breaking weights in pounds.
1	Solid Cylind.	Cast Iron	Hemispherical	60·5	0·5	113	·49	136
2	do.	do.	do.	60·5	0·5	136	·23	150
3	do.	do.	do.	60·5	1·53	10525	·14	10861
4	do.	do.	do.	60·5	1·96	24857	·6	25403
5	do.	do.	do.	30·25	0·99	4985	·13	6105
6	do.	do.	do.	15·125	0·5	1997	·31	1997
7	do.	do.	Plane	30·25	1·	21629	·27	21853
8	Solid Prism	do.	do.	60·5	1·03×1·02	4052	·43	4164
9	Hollow Cyl.	do.	Hemispherical	90·75	Ext. di. 1·78 Int. di. 1·21	3317 5333	·11 ·49	5585
10	do.	do.	Plane	do.	Ext. di. 1·78 Int. di. 1·21	8861 16705 17489	·11 ·5 ·66	17840
11	Solid Prism	Danzig Oak	Rounded	60·5	1·75×1·75	2141	·13	2749
12	do.	do.	Plane	do.	do.	9949	·14	10171

n his experiments Mr. Hodgkinson has obtained the ing conclusions:—

the pillars whose lengths exceeded four times their ters became bent before they broke; and when the were of uniform dimensions, both ends being plane or emispherical, the greatest flexure was near the middle length and the fracture was at that place; but when nd was plane and the other hemispherical, the fracture a distance from the rounded end equal to about one- of the whole length.

lars of cast iron with plane ends, and having their lengths thirty times their diameters, were broken by weights to one-third or one-fourth of those which would crush if they had been made short enough to be crushed without ng: and when the lengths of pillars, whether made of ron, wrought-iron, steel, or timber, were from 30 to 121 their diameters, the ratio between the weights supported ose with flat and those with rounded ends was nearly o 1; the weight, in the latter case, falling almost entirely e axis. The strength of iron columns with flat ends ared, however, to suffer a diminution of relative strength ey became shorter; and this was found to be owing to endency of those columns to be crushed by the greater ht which, in order to produce flexure, it became necessary ace on them. The ratio between the strengths of pillars ng both ends flat and both rounded, within the lengths e mentioned, was nearly constant; and when one end of umn was rounded and another flat, the strength was found nearly an arithmetical mean between those of the other rs.

some of the experiments the cast-iron columns were ed with disks at their ends, the diameters of the disks about twice as great as those of the columns; and it was that these sustained a greater pressure before breaking the simple columns: the strengths of such columns were equal to those of columns of equal diameters and half lengths, the ends of the latter being hemispherical. columns were thicker in the middle than at either end, strength was thereby increased, if compared with cylin- columns, by one-ninth or one-seventh.

Hodgkinson succeeded, in many of his experiments, in ining the position of the neutral point; and, among the ments stated in the above table, the fifth and sixth are n which the situation of the point appears to have been tly ascertained. In the former it was at a distance from mpressed side of the column equal to 0·23 inch; and, latter, at a distance from the like side equal to 0·11, measured, in both cases, at the place of fracture, in the ion of a diameter. In the prismatic pillars, the flexure s took place in the direction of a diagonal. The hollow ns used in the experiments were often thicker on one than on the opposite, yet the strength of such columns ed little from those of columns of uniform thickness: the n for this seems to be that the thin side was almost always ch was compressed; and as iron resists compression ut six times the force with which it resists tension, it ow that such a column would seldom give way on the ressed side.

solid cast-iron pillars whose lengths were from 30 to 121 their diameters, the ends being hemispherical, the king weight, with flexure, varied nearly as a power of the eter whose exponent was 3·76: when the ends were e, that exponent was 3·55. When the diameter was so small that very little compression took place before the pillars broke, the exponent was nearly equal to 4, agreeably to the mathematical formula above stated. In the like pillars, whether the ends were rounded or flat, the breaking weights varied inversely as a power of the length whose exponent was 1·7. The experiments on hollow cast-iron cylinders whose lengths were not less than 30 times their external diameters, showed that the above exponents of the powers of the external and internal diameters, and also of the lengths, hold good for the breaking weights. Computing therefore the coefficients, on the supposition that the diameters were expressed in inches and the lengths in feet; the expressions for the breaking weights (W) in pounds were:—for hollow cylindrical columns with hemispherical ends,

$$W = 33379 \frac{d^{3\cdot76} - d'^{3\cdot76}}{l^{1\cdot7}};$$

and for such columns with flat ends,

$$W = 98922 \frac{d^{3\cdot55} - d'^{3\cdot55}}{l^{1\cdot7}}:$$

the same formula serving for solid cylinders by making, in both, $d' = 0$.

FLINDERSIA. [CEDRELACEÆ, P. C. S.]

FLINK, GOVERT, a very able Dutch painter, born at Cleves in 1616. His parents were wealthy, and designed Govert for a merchant, an occupation to which he showed every disinclination; but his parents steadfastly opposed his own inclination to become a painter, until they happened to hear a sermon by Lambert Jakobzen, a Minorite of Leeuwarden, who was himself a painter. They in consequence changed their notions as to the eligibility of Govert's choice, and placed him with Jakobzen to learn to paint. He studied afterwards a year under Rembrandt at Amsterdam, and completely mastered his style of execution and colour, and adhered to it for some years until after the death of Rembrandt, when the Italian taste prevailed, and he had seen the works of Rubens and Vandyck. Flink then took as much pains to get out of Rembrandt's manner as he had before taken to acquire it. He was however as successful in the one as in the other, and produced several historical pictures and many portraits, all of which rank among the best productions of the Dutch school. He died in 1660, aged only forty-four. If he had not died at so early an age, he would probably have produced many noble works, as his last picture is his best, his Solomon praying for Wisdom, in the Council Hall at Amsterdam. He has also painted many admirable portraits: he has had few superiors as a portrait-painter.

Flink formed a good collection of prints and Italian drawings, which was sold after his death for 12,000 florins.

(Houbraken, *Groote Schouburg*, &c.)

FLINT. The true origin of this mineral substance—as it occurs in the chalk of Europe especially—has been, and still is, the subject of much discussion among microscopists and geologists. Mr. Bowerbank believes generally in the origin of flints (and some allied minerals) from sponges. In confirmation of this view spicula, such as characterize the silicious sponges (Halispongia), are found in flint, and on the surfaces of flints peculiar marks of organization referable to spongeous texture. Ehrenberg, finding in some flints abundance of infusorial animalcula, suggests the origin of flint from aggregations of these silicious-shielded microzoaria. Mr. Charlesworth has recently found flint occupying the closed pulp cavity of a tooth of mososaurus, and regards this fact as opposed to both speculations.

It appears desirable to prosecute still further the microscopic researches on this subject, and to extend the inquiry to other silicious minerals, especially the cherts which lie in the oolite of Yorkshire, the lias of Mendip and Glamorgan, and the mountain-limestone of Britain generally.

FLOOR. [House, P. C. S.]

FLOOR-CLOTH. The use of a covering for floors, though partly dependent on other circumstances, is mainly determined by the kind of material of which the floor is made; since, so far as decoration is concerned, certain kinds of flooring are in themselves more elegant than any covering that could be applied to them.

Checquers of black and white, or various-coloured marble, form a kind of flooring well adapted for large buildings; because there is space at command for producing a pattern both large in size and complex in details. The pavement beneath the dome of St. Paul's well illustrates the facilities afforded by this kind of flooring for the development of a large design: it is quiet to the eye, and is not frittered down into insignificance by the smallness of the different patterns. The *mosaic* pavements, so much adopted by the Romans, appear to have been more frequently used for floors of moderate size than for those of great magnitude. The halls of private houses and many of the principal apartments seem to have been often floored in this way: the flooring, in such cases, consisted usually either of a series of ornamental borders enclosing one or more compartments containing a device or group, or of a uniform pattern in two or three colours. [Mosaic, P. C.] Another kind of flooring, technically named by the French *parquetry*, owes its beauty to the arrangement of small pieces of wood in an ornamental form: it is, in fact, a species of mosaic in wood. About two centuries ago this sort of workmanship was in high favour, especially in France, where a workman named Boule carried the inlaying process to a high degree of delicacy. In some examples the pieces of wood employed were so small and the colours so selected, as to admit of the formation of pictures, or of small articles for furniture or ornament: in such case the term *marquetry* was applied to the result produced, *parquetry* being the name employed when floors were the object of the workmanship. Since the use of sawing and planing machines the production of parquet flooring has been rendered more easy than formerly. The simpler kinds are said to have had their origin in a desire to avoid the warping of long narrow boards, by employing boards only three or four feet long by as many inches in width, and arranging them in various patterns. In a recent periodical work ('Art-Union,' 1845) it is stated that a foreigner, Mr. Steinitz, has lately extended the use of such flooring as this in England; he has floored two small rooms in Windsor Castle, and a portion of one of the staircases in the new Royal Exchange. He is said to proceed thus:—The thin layers, or veneers, of ornamental wood are fitted on stout oak frames formed into compartments, comprising squares, diamonds, polygons, or any other desired shape; the oak frames are rather more than an inch in thickness, and the rich or coloured wood laid on them is from a quarter to three-eighths of an inch in thickness. All beautifully grained wood, capable of being cut up into veneers, such as maple, cedar, mahogany, satinwood, rosewood, and ebony, are available for this purpose.

Floors possessing an ornamental character are, however, decidedly an exception to the general rule; and it has become customary, in this country at least, to lay down some sort of covering on the wooden boards of which the flooring is formed, in most rooms a little removed from the humbler class. Two extensive branches of manufacture have become by degrees established for this purpose—that of *Carpets* (for which see Carpet, P. C.), and that of *Floor-cloth* or *Oil-cloth*, more modern and less important than the other. As both of these kinds of covering are formed of cloth, and as *Drugget* is a sort of medium between the two, it is not difficult to see how motives of economy may have led from the use of a carpet to a plain drugget, and from this to a painted drugget or cloth, more or less diversified in the arrangement of the colours.

Floor-cloth is made partly of hemp and partly of flax, the former being the cheaper of the two, but the latter better fitted to retain the oil and paint on the surface. As a means of avoiding the necessity for seams or joinings in the cloth, looms are constructed expressly for the weaving of the canvas, of the greatest width likely to be required. As brought to the floor-cloth factories, the pieces of canvas
rally one of these scales of dimensions:—a hundre
by six wide, a hundred and eight yards by seven,
and thirteen yards by eight. The flax and hemp a
the canvas woven, almost entirely in Scotland,
Dundee; and the degree of fineness is generally
present about sixteen or eighteen threads to the l

The canvas, throughout the subsequent operati
the same width as was given to it in the loom; b
into pieces varying from sixty to a hundred feet
of these pieces has to be stretched over a frame i
position; and in most of the factories there is a l
of such frames, some a hundred feet long by
twenty high, others sixty feet long by twenty-fo
a means of transferring the canvas to these fr
when the bales are opened, cut to the proper
down on the floor of a large room, and coiled r
wooden roller about five inches in diameter; t
then lifted up vertically and removed close to the
edge of the canvas is nailed or hooked to one
frame, and the roller is made to travel onwards an
in such a manner as to give off the canvas as fast
can be hooked to the upper horizontal bar of the f
all is uncoiled and the canvas hooked on all four
the sides of the frame are so drawn by winches a
to stretch the canvas to a degree of tightness ne
that of a drum, notwithstanding the extent of
(from fifteen to eighteen hundred square feet).
canvas remains many weeks, during most of the p

Before the imprinting of the pattern which fo
conspicuous feature in floor-cloth, the surface o
requires a great deal of preparation, to render it
durable. The pattern is applied on one surfac
both surfaces are painted and prepared, the back
front. A wash of melted size is applied by mea
to each surface; and, while this is yet wet, t
well rubbed with a flat piece of pumice-stone,
little irregularities of the canvas are worn down, a
tion is laid for the oil and colour afterwards to
To work over so large an extent of surface, the
provided with narrow scaffoldings, built up in f
not in contact with, the surface of the canvas:
being in front and another behind the canvas.

When the size-preparation is dried, the pain
The paint employed consists of the same miner
those used in house-painting, and, like them,
linseed oil; but it is much thicker or stiffer in cons
has very little turpentine added to it. The fi
paint is applied with a trowel; or rather, the pai
on in large masses here and there, by means of a
then levelled and spread by means of a kind of tr
or fourteen inches in length. Ten or twelve days
for this thick coating to dry; and at the expira
time a second coating is laid on, thinner than the
applied with a brush instead of a trowel. These
of paint are all which the back or hinder surface
vas receives; but the front or face receives a gr
ness and a greater number of processes. For in
the sizing, the surface is rubbed down with pu
then comes the 'trowel-colour,' followed by a seco
with pumice; and then two, three, or more layers
applied with a brush, each coating being follo
rubbing with pumice before the next one is app
surface has by this time acquired a great degree
ness, and the general substance a suppleness and p

The prepared canvas is next removed from its ve
tion in the frame, and wrapped round a roller,
placed as to allow the canvas to be uncoiled and
on a table to be printed. The printing of floor-cl
ducted much on the same principle as that of pape
for rooms [Paper-hangings, P. C.], and that of
printing,' viz. the successive application of two
blocks or engraved surfaces, each one giving a dif
of the device from the others, and being supplied
of a different colour. In the infancy of this art t
was given by means of 'stencil-plates;' that is, th
metal or of pasteboard were pierced with holes a
intended to form the pattern, and the paint was so
to fall through these holes upon the surface of
spread out beneath. It was rather less than a c
that the use of wood-blocks superseded that of st
for this purpose. The first block so employed
fifteen inches square, and had a simple device of

pon its surface; when this was pressed face downwards
ushion coated with wet paint, it took up a layer on all
ised parts of the device, and was then in a fit state to
t its impress to the canvas. The increased complexity
g from the employment of several colours was a feature of
n troduction.

at present conducted, the printing of floor-cloth with
l colours requires much care on the part of the designer
the painter enters on his department. In the first
the device is carefully drawn on the full scale on
sheet of paper, and is coloured fully in every part
ing to the exact appearance which it is intended to
t on the canvas. A second piece of paper is placed
this, and with a pin or pricker a series of holes is made
h both papers, following the outlines of the pattern so
regards one colour, which we may suppose to be green;
r blank paper is placed under the pattern in lieu of the
r, and the outlines of another coloured portion of the
are marked through both papers with the pricker;
on as many times as there are colours, the outline of
colour being transferred to a paper distinct from the
. An equal number of blocks of wood are then pre-
; these consist of two thicknesses of white deal and one
r-tree wood, ranged at right angles with respect to the
to prevent warping; they are about fifteen inches
, by two and a half in thickness, and the pear-tree
e is the one on which the engraving is to be executed.
f the pricked papers is laid down on a prepared block,
little bag containing pounce or pounded charcoal is
d all over it; the powder enters the pin-holes, and
upon the surface of the wood a series of dots sufficient
de the carver in working out the design, which he does
tting away all the surface except where the lines of
are marked. All the other blocks are treated in the
way; and it is easy to see that each one is left uncut at
parts which are cut away in all the others, so as to avoid
sion of colours.

e blocks (which we will suppose to be four for one
n, red, yellow, blue, and green) being ready, and the
red canvas spread out on a flat table, the printing com-
es. The paint (say red) is applied with a brush to the
e of a pad or cushion formed of flannel covered with
cloth; the block, held by a handle at the back, is placed
downwards on this cushion, and the layer of paint thus
ned is transferred to the surface of the canvas by
ing the block smartly down on the latter. A second
ession is made in a similar way by the side of, and close
he first; and so on throughout the length and breadth
e canvas; each impression being about fifteen inches
e. The proper junction, or 'register,' of the successive
essions is aided by pins at the corners of the blocks.
n the whole surface is thus printed with one colour, all
ther three are similarly applied in succession. Such
l likewise be the case if the number of colours was more
four: but the greater the number the greater would be
re necessary in adjusting the numerous partial impres-
so as to ensure a proper arrangement of the whole.

printing floor-cloth for passages and stairs, where the
seldom exceeds a yard, the canvas is prepared in
ames as in other cases; but it is cut up into strips before
printed, and has usually a border given to its pattern
eans of blocks much narrower than those employed in
cases. Where there are large patches of one colour in
pattern of floor-cloth, they are not given by smooth
es on the block, but by means of little projecting squares
ically called 'teeth;' the reason for this is, that if a
e two or more inches square were laid on wet paint, it
d not take up the paint equally, but would exhibit it in
equal splat; whereas, if the surface were broken up into
ber of smaller surfaces by means of lines cut in various
tions, these lines would act as air-vents, and the paint
d be taken up pretty equally by the little squares or teeth.

ne among the features which distinguish 'cheap' oil-
(so called) from good, is the hastiness with which the
es are conducted; the paint has often insufficient time
ying, and is sold for use before it is fitted to bear the
on of the feet. It has been suggested, with some pro-
ty, that floor-cloth may tend to rot the boards of a floor-
a damp room, by preventing the free escape of vapour.

r. Loudon ('Encyclop. of Cottage and Villa Archi-
e,' p. 345) notices a suggestion for the use of paper
d of floor-cloth or carpet. The carpet, according to
suggestion, is formed in the first instance of any fragmentary pieces of linen, cotton, canvas, or other material, sewn up to the required size. This cloth is stretched on the floor of a large room, and kept down in its place by being pasted round the edges. On this foundation stout paper is pasted; two thicknesses being applied in every part, with the joints so arranged as to be but little perceptible. On this a surface of wall paper is pasted, and here an opportunity for the exercise of taste is afforded, since a variety of pleasing patterns may be obtained by the judicious combination of fragments which are in themselves of very little account. When the pattern is thus far produced, it is coated twice with warm melted size, applied so as to soak into every part of the paper, and prepare it for the reception of the varnish. One or more coatings of boiled oil are applied after the size, and to the oil succeeds copal varnish. Of the floor-covering so produced it is said, 'these carpets are portable, and will roll up with about the same ease as oil-cloth; they are very durable, are easily cleaned, and if made of well-chosen patterns have a very handsome appearance. Where labour is cheap the cost will be very trifling; the materials being of little value, and the expense consisting chiefly in the time requisite to put them together. Where cloth cannot be easily procured, the carpet may be made by pasting paper to painted boards; when by repeated coats of paper it has become strong and firm, it will separate from the paint and will be as durable as if mounted on any kind of cloth. For earth, brick, or stone floors, in order to render them impervious to damp, these carpets may be made with two faces, by pasting paper on both sides of the cloth which forms their basis, and well oiling or varnishing them on the under as well as the upper surface; they may also be bound with leather or any strong substance, to prevent moisture from penetrating to the paste.' (p. 346.)

It has also been more than once suggested, that 'Geographical carpets' might advantageously be constructed for school-rooms and similar apartments. By this term is meant the employment of a carpet or covering in which the lines of a map are substituted for a regular pattern. There would, as Mr. Loudon has stated, be a good deal of difficulty in working out the idea, since it would have to be decided whether the map should be *printed* before being laid down as a carpet, or filled in by hand afterwards. The choice of material too, whether linen, holland, or paper, would be attended with some difficulty; but such a map, especially if the northern portion of it were directed to the northern side of the room, would not be without its value in rendering the position of a country or district familiar to the inmates of the room.

FLORENTI'NUS, a Roman jurist, whose praenomen is unknown. His period also is uncertain, but he lived after the Emperor Antoninus Pius, for he cites one of his Constitutions, and names him Divus (*Dig.* 41, tit. 1, s. 16). He is not mentioned by any of the jurists who are cited in the Digest, a circumstance which seems to argue that he belonged to a later age than any of them, or was at least as late as any of them. He wrote eleven books of Institutiones, from which there are a few excerpts in the Digest.

FLORIS, FRANS, or FRANS DE VRIEND, was a celebrated Flemish painter; Vasari terms him the Flemish Raphael. He was born of a good family at Antwerp, in 1520; his father, Cornelis de Vriend, was a sculptor, and Frans was himself a sculptor in his earlier years. He learnt painting under Lambert Lombardus at Liège, and studied afterwards the works of Raphael, Michel Angelo, and the antique, for some years at Rome. He returned with a great reputation to Antwerp, and formed a numerous school there. He was the most distinguished painter in the Netherlands in the time of Charles V. and Philip II., and would probably have been much employed by these princes had he not been notorious for a love of wine, which he habitually took to excess, and he had the reputation of being as great a drunkard as painter. He died at Antwerp in 1570.

Van Mander and Descamps mention several works by Floris which are now lost; but there are still some excellent works by him in the Netherlands, and there are others in the galleries of Vienna, Dresden, and Berlin.

One of his best works is a Nativity, in the Cathedral at Antwerp, which in Sir Joshua Reynolds's opinion is well composed, well drawn, and well coloured; Sir Joshua admired also his Crucifixion, at the Recollets. Floris etched a few plates, and some of his designs were engraved and published by Jerome Cock.

(Van Mander, *Leven der Schilders;* Descamps, *Vie des Peintres Flamands,* &c.)

FLOWERS, ARTIFICIAL. The Italians, according to Dr. Ure (*Dictionary of Arts, &c.*, art. 'Flowers, Artificial'), appear to have been the first people in Europe who excelled in the art of making these elegant ornaments, though of late years the French have displayed most ingenuity and taste in the manufacture. Ribbons of various colours, folded into the required forms, were, according to the above writer, originally employed for imitating flowers, by being attached to wire stems. This imitation, he says, soon gave way to that by feathers, which are more delicate in texture, and more capable of assuming a variety of flower-like figures; but it was found difficult to dye them with colours of the requisite vivacity. 'The savages of South America,' he adds, without quoting any authority, 'manufacture perfect feather-flowers, derived from the brilliant plumage of their birds, which closely resemble the products of vegetation. The blossoms and leaves are admirable, while the colours never fade.'

The cocoons of the silk-worm, which take a brilliant dye, preserve their colour, and have a transparent velvety appearance suitable for the imitation of petals, are sometimes used by the Italian flower-makers. The French, of late years, have used the finest cambric for petals, and the taffeta of Florence for the leaves; and M. de Bernardiere has introduced artificial flowers made of exceedingly thin leaves or laminæ of whalebone, which may be bleached and dyed of various hues. Sometimes petals and leaves are made of velvet, coloured by the application of a finger dipped in the dye. Dr. Ure adds directions for dyeing various colours required in the manufacture of artificial flowers.

The stems of artificial flowers are mostly formed of wires, (the largest being of two or more wires twisted together), wrapped round with paper, silk, or some other material of the required colour; and wires are also sometimes applied to the leaves and other parts which need support. The leaves and petals are mostly cut, and, if needful, embossed, by stamping with dies with sharp cutting edges, and are united together by means of wires and paste or cement. The modes of colouring are of course exceedingly various, it being in many cases necessary to apply colour only to one part of a petal, or to apply two or more colours to one petal. Seeds and similar objects, and small fruits, such as currants, are beautifully imitated by wax, glass, or other compositions; and by the judicious intermixture of a variety of other materials, almost any object in the vegetable kingdom may be imitated with surprising accuracy and beauty. To such perfection is the manufacture carried, that artificial flowers are not only employed as decorations in ladies' head-dresses, but are also much used as elegant table or mantel-piece ornaments. When thus employed, as they are not liable to the same shaking and rubbing as those used in dress, more fragile and easily injured materials may be employed. Wax flowers are made of extreme delicacy for such purposes, and we have lately seen cheap but beautiful imitations of them in paper coated with wax. Rice-paper is also occasionally used for the purpose. Artificial flowers formed of shells, which, by a judicious choice of forms and colours, may be made of far more natural appearance than would be supposed, are also used for such purposes, although, unless very small, they are too heavy for head-dresses.

The manufacture of artificial flowers is conducted almost entirely by girls and women; and as it depends mainly upon taste and manual dexterity, it forms a very suitable as well as important branch of female employment.

FLUIDS, ELASTIC. This name may be applied to all the fluids in nature, since all are in certain degrees elastic; but it belongs particularly to such as are aeriform, liquid substances possessing the property of elasticity in a very low degree. Among the aeriform fluids, however, those which are usually considered as permanently elastic are called gases; and the term elastic fluid is frequently confined to atmospherical air and the vapours which are produced from solids or liquids by the action of heat; these last are therefore such as may be rendered solid or liquid by reducing their temperature, or by increasing the pressure under which they exist. But the difference between these and the fluids which are called permanently elastic is perhaps nominal, since many of the latter, by the discoveries of Dr. Faraday, are found capable of being exhibited in a liquid form. [GAS, P. C.] This philosopher, for example, obtained carbonic acid in a liquid state from carbonate of ammonia, by subjecting it to great compression in a sealed tube, one end of which was placed in a freezing mixture. The liquor was colourless. Many of the gases, moreover, on being combined with one another and with other substances, form solids or liquids: thus, oxygen gas unites with metals and becomes solid; ammoni and muriatic gas unite and form the solid called m ammonia; while oxygen and hydrogen gas unite water.

Almost all gases are invisible; but several whic when they exist alone, become visible on being mi one another. Thus, deutoxide of azote being mi atmospherical air or with nitrous acid, the com becomes visible and of a red colour. Several g become visible when mixed with aqueous vapour. mentation of the temperature of vapour may, by prod increased rarefaction, render it invisible; and, on t hand, a diminution of temperature will cause such a sation as may render visible a vapour which before perceptible. These effects of heat and cold upo have been proposed as explanations of the apparent di of the mass of a comet when near the sun, and of its enlargement in receding from that luminary. Al fluids are transparent, but different quantities of l absorbed in passing through those of different ki when the thickness of a stratum of fluid is consider absorption is so great as to render an object b invisible.

The elastic forces of a dry gas at a given tempe inversely proportional to the volumes they occupy; law holds good also both for mixtures of elastic vap each other, and of vapours with gases, provided no action takes place between them. Thus, different equal temperatures and equal elastic forces being i together in a close vessel whose capacity is equal t of the volumes of the fluids separately, the fluids remain separately in equilibrio; but experience sh gradually the fluids intermingle with one another, a homogeneous fluid preserving the same temper elastic force. It has been found also that if diffe having equal temperatures with different elastic f occupying separately equal volumes V, be mixed t a close vessel whose capacity is V, the elastic for mixed fluid will be equal to the sum of the elasti the separate fluids, and the temperature will remain When a vapour at a given temperature is comp being confined within a smaller space than that previously occupied, part of the vapour becomes c and the remainder continues to possess the elastic fo the temperature. And again, if the volume of a q vapour be increased, the vapour will expand, and, contact with the liquid from which it was produced, force will be diminished; if in contact with the li vapour will rise to supply the void created by the and the elastic force will remain constant.

The temperatures at which liquids become elastic the action of caloric are very various: muriatic æthers boil, under the usual pressure of the atmo about 70° (Fahr.); sulphuric æther boils at 98°, æther at 160°: water boils at 212°, while mercu made to boil only at a temperature of 670 degrees.

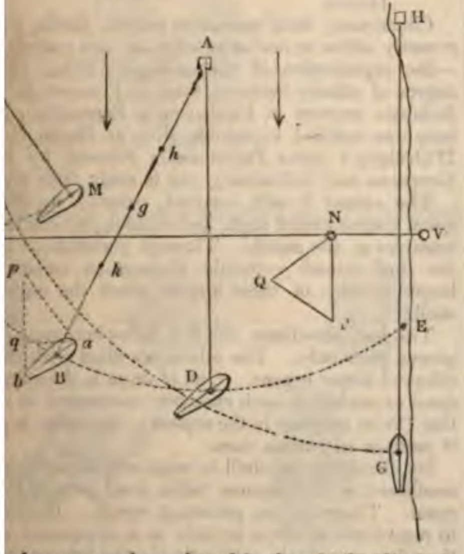
The quantity of vapour produced by heat from increases with an increase of temperature, and whi tact with the liquid its elasticity varies with it gravity. The elastic force of vapour is increased vapour is mixed with air; for if the interior of a tube be moistened at the upper end with water, a introduced in it above the column of mercury, the t inserted as usual in a cistern of the latter fluid, the d of the mercurial column in the tube by the expansi vapour and air, in consequence of an application o the exterior, is greater than that which results from pansion of air when dry.

The atmosphere which surrounds the earth is endo an elastic power; and partaking, moreover, of th diurnal rotation, its particles should, by their elasti centrifugal force combined, recede from the earth whole is dissipated in space. Such is not the fact; a it is inferred, either that at a certain elevation a surface of the earth, the elasticity of the atmosphere destroyed by the absence of caloric; or that be stratum in which the centrifugal force of the particle to their gravitation, there may exist, in a state of ætherial fluid occupying the whole extent of space, venting the atmosphere from being further expand own elasticity.

Now, by Mechanics, it may be found, that the from the surface of the earth to the stratum of the at

centrifugal force of the particles is equal to their
bout five semidiameters of the earth, at which
ensity must be inconceivably small; and since it
ary to suppose that the ætherial fluid beyond the
of the earth is more dense or more elastic than
ere at that height, it may readily be admitted,
r may be the effect of such a fluid in resisting the
comet, it can produce no sensible retardation of
ıts of the planets.
scular light which has been observed at the cusps
d the changes which take place on the apparent
s and Jupiter, afford indications that those planets
heres, though, with our instruments, such atmos-
not be rendered sensible by their action on
light. If, about a planet, an atmosphere were
onsequence of the attraction exercised by the
he ætherial fluid supposed to fill all space,
luid may have no greater density and elastic
the atmosphere of the earth at the height of
ıeters of the latter above its surface, the attrac-
lanet may be incapable of rendering it sufficiently
duce any sensible effect in refracting light to the
in, the height and the law of the variations in the
ıe strata in an atmosphere which may be formed
t by the vapours arising from waters existing on
ould depend on the temperature; and this we
ns of knowing: but assuming it to be equal to
ıperature at the surface of the earth, the height
sphere would be very small compared with that
ng atmosphere about the earth. An atmosphere
the kinds here indicated would serve to account
occurrence of remarkable refractions in the phe-
e immersions and emersions of Jupiter's satellites,
ation of stars by the moon.
roperties of elastic fluids, see also ELASTICITY,
s, P. C.; VAPOUR, P. C.; and EVAPORATION,

Y-WHEEL. [WHEELS, P. C., p. 316.]
BRIDGE. This consists usually of a boat or
which, being attached by a rope to a buoy moored
e of a river, is made, by the action of the current,
ss on an arc of a circle of which the buoy is the
large rivers, at places where the communications
re very frequent, such bridges will probably, in
ıperseded by steam-vessels; but, for temporary
l particularly to facilitate military operations in
ere steam navigation is not in use, they may be
t importance.



a buoy securely anchored in the middle of a river,
to which, at a point about one-third of the ves-
rom the head, is attached one end of the cable or
then $p\,b$ indicating the direction of the current,
b of the boat be inclined to that direction in any
, the pressure of the water against one side of the
solved in a direction $q\,a$ perpendicular to $p\,b$, or
er, will cause the boat to describe the arc C D E,
e is A. As far as the point D, in the middle of
the river, the boat descends the latter; and, afterwards, it ascends obliquely against the current; but, while its keel is kept by the rudder in a position nearly parallel to $b\,a$, the force parallel to $q\,a$ continues to act and impel the boat towards E. If f represent the direct force of the current, and θ the angle $p\,b\,a$, the force perpendicular to $p\,b$ will be expressed by $f \sin^2\theta \cos\theta$; and this will be a maximum when $\theta = 54° 44'$.

It is evident that by increasing the length of the rope A B, the length of the arc between C and E will be diminished; the retardation arising from the action of the current, in ascending from the middle of the river to E, will also be less: the length of the rope or chain should, in fact, be such that the arc C D E may not exceed a quarter of the circumference of the circle; and when, for this purpose, the length is very great, it must be supported as at g, h, and k, on moveable buoys or small boats.

A flying bridge sometimes consists of a simple flat-bottomed vessel, having a mast fixed to one of its sides in the middle of its length. The cable passes through a block at the mast head, and is attached at one end to the opposite side of the vessel, the other end being made fast to the buoy. Two ropes connected with the cable lead one to the head and the other to the stern of the vessel; and, by pulling on one of these, the other being let go, the vessel is placed in a position oblique to the current: this position is retained by means of a steering oar aided by a current-board which may be let down into the water at the head or stern as the case may require.

In a rapid current it may be impossible to make the boat B move up the ascending arc D E; in which case a boat at F, by means of a cable made fast at H on the opposite bank, may be allowed to describe the descending arc F G. On setting out from F, the boat takes with her a coil of rope, of which one end is attached to a fixed object near that place; then, on arriving at G, the boat is drawn up along the bank to H; and by the rope is hauled across the river to F, from whence it set out. Again, a rope being made fast to an object near F, a boat may be steered obliquely from some point as K, till she comes to a part, as M, of the river at which the current acts strongly upon her; then letting go the rope and, by the rudder or steering oar, keeping the boat's keel at a proper inclination to the direction of the current, the resolved force of the water will impel the boat to some point, as G, on the opposite bank.

When the river is too wide for a boat to swing over in a single arc, two buoys may be moored in a direction across the river, at equal distances from the banks and from each other, and two boats connected with them by ropes may be impelled in circular arcs, one extending over the first half of the breadth of the river, and the other over the second: a raft being moored in the middle facilitates the transference of the passengers, &c. from one boat to the other; or, without the raft, one boat, on arriving in the middle of the river, may transfer its passengers immediately to that which is to describe the other half of the breadth.

A triangular raft N P Q having its front, as N P, parallel to the direction of the current, and being connected by a ring at N, with a rope S V stretched tightly across the river, may, by a resolved force of the current on N Q, be impelled directly to the opposite bank; and, on reversing its position so that P may be connected by a ring with the rope S V, the raft may be impelled across in a contrary direction. A boat running by a ring at one end, on S V, may, by being kept in a position corresponding to that of the line N Q, in like manner be *sheered* across the river.

On broad rivers, and when objects of great bulk and weight, as horses, carriages, or artillery, are to be conveyed across, two boats or barges placed in parallel positions, and carrying a platform extending between their exterior gunwales, are employed: the bay or interval between the vessels is as wide as is consistent with the strength of the platform, in order that as much as possible of the current may act against a side of the lower vessel. The vessels are made narrow and deep, and each is provided with a mast, which may be from twenty to thirty feet in height; these are connected together at ten or fifteen feet from the platform by two horizontal beams, one above the other, and between them is a block of wood which is capable of sliding from one mast to the other. The cable or chain is made to pass through a perforation in the sliding piece, and the latter is placed contiguously to either mast, according to the direction in which the vessels are to move. A drawbridge is constructed on each side of the platform, and one of them is let down to form a passage when the vessels arrive at the landing-place on either side of the river. Each vessel has a rudder, and the tillers are connected by a bar, in order that one man may be able to turn both.

For ample details concerning the subject of this article see 'An Essay on the Construction of Military Bridges,' &c., by Major-General Sir Howard Douglas.

FOG. [Mist, P. C.]

FOHR, CARL PHILIPP, a young landscape painter of very great ability, was born at Heidelberg in 1795. In 1816 he visited Rome, and made the acquaintance of Cornelius, Veit, Overbeck, and Koch the landscape painter, and he shortly painted two large pictures there, which ranked him among the first painters of his class, and procured him the notice, patronage, and friendship of Ludwig I., the present king of Bavaria, then crown-prince. This great patron of the arts, compared with whom Lorenzo de' Medici was but a shadow in magnificence, was strongly impressed with Fohr's ability; on taking leave of him at Rome, he pressed his hand, saying 'Wir sehen uns wieder; wir gehören uns näher an' (We shall see each other again, we belong nearer to each other). It was not so, however; Fohr was drowned in the Tiber while bathing, on June the 29th, 1818, in the sight of three friends, who could afford him no assistance. Several of his early landscapes are in the museum at Darmstadt; a Life of him was published at that place in 1823: his portrait has been engraved by Amsler, one of the friends who witnessed his death.

(Nagler, *Neues Allgemeines Künstler Lexicon*.)

FONTA'NA, PROSPERO, a celebrated painter of Bologna, where he was born in 1512. He was the pupil of Innocenzio da Imola, the assistant of del Vaga and Vasari, and the master of the Caracci; and was of great authority in Bologna until the establishment of the school of his pupils. As a fresco painter Fontana was a mere machinist, but in portrait he was one of the first painters of his time. There are frescoes by him at Bologna, at Rome, and at Città di Castello, where in a few weeks he painted a great hall in the Palazzo Vitelli illustrating the deeds of that family. He was presented by Michelangelo as a good portrait painter to Giulio III., who took him into his service, as did also his three successors. Fontana died at Rome in 1597. Lavinia Fontana, called also Zappi, the name of her husband, was the daughter of Prospero, and likewise distinguished herself for her ability in painting, especially in portrait; but she executed works in various departments of painting, all finished with care and delicacy. Some of her portraits have passed for the works of Guido. She was a great favourite with the noble ladies of Rome from the time of Gregory XIII. to Paul V.; she painted Gregory's portrait. She died at Rome in 1614, aged sixty-two.

(Malvasia, *Felsina Pittrice*; Lanzi, *Storia Pittorica*, &c.)

FONTEVRAULT. [Maine et Loire, P. C.]

FOOT. [Skeleton, P. C.]

FOOT-PRINTS, impressions of the feet of reptiles (as of Cheirotherium) and birds (Ornithichnites), are now become recognised evidence of the existence of particular races of organic beings, in certain geological periods, though no other traces of them remain. By this evidence, the air-breathing vertebrata appear to be of higher antiquity than was formerly supposed, and to date from the upper parts of the carboniferous system.

FORAMINI'FERA, FOSSIL. The expectations of naturalists and microscopists, from Lamarck to Ehrenberg, that in the composition of the stratified crust of the globe minute organized bodies have had a more important share than the bones of Vertebrata and the shells of Mollusca, appear to be fully justified by recent discoveries in the Cainozoic and some of the Mesozoic strata. In most countries the superficial marls and silts which are associated with peat, are found to be full of the siliceous shields of Infusoria; some of the tertiary sands are loaded with the calcareous shells of Foraminifera, and this group has been distinctly traced downwards into the chalk, the oolite, and mountain limestone, and probably even into the Silurian rocks. These Foraminifera diminish in number as we pass below the chalk: perhaps also they recede more from the forms of existing minute Polythalamacea, but this is a point requiring much further investigation. The most abundant forms in the chalk belong to a few groups entitled Rotalia, Spirolina, and Textilaria. In the oolites and mountain limestone the forms generally resemble those of Textilaria: —

The following table exhibits a summary of the distribution of the genera.

In Cainozoic strata of Britain, according to Morris's Catalogue.	Anomalina.
	* Biloculina.
	Cristellaria.
	Dentalina.
	Glandulina.
	Globigerina.
	Marginulina.
	Nodosaria.
	Nonionina.
	Operculina.
	Planorbulina.
	* Polymorphina.
	Polystomella.
	Quinqueloculi
	Rotalina.
	Rosalina.
	Rotalia.
	Spiroloculina.
	* Textilaria.
	Triloculina.
	Truncatulina.

In the Cainozoic strata, taken generally, Bron 46 genera, and Ehrenberg has augmented the nu

In Mesozoic strata. Chalk of Maestricht, Meudon, Wilts, &c. (Morris's Catalogue.)	* Bulimilina.
	Cristellaria.
	Dentalina.
	Gandryina.
	Globigerina.
	Lituola.
	Marginulina.
	Nummulina.
	Rosalina.
	Rotalia (7 species
	Siderolina.
	* Spirolina.
	* Textilaria.
	Truncatulina.
	Turbinulina.
In Mesozoic strata. Oolite of Caen. (Bronn.)	Cristellaria. Planularia.
Oolite of Stonesfield.	Textilaria ? Rotalia ?
Oolite of Yorkshire.	Rotalia ? Textilaria ? frequ
In Palæozoic strata. Mountain Limestone of Bristol.	Textilaria ?
Limestone of South Devon.	Genus ?

Concerning these numerous minute fossils, El recently added to our knowledge on two material —the organization of the analogous living rac degree of affinity between fossil and recent forn fortunate capture at Cuxhaven in September, 1 berg was enabled to exhibit alive at Berlin tw D'Orbigny's genus Polystomella (classed by El Geoponus and Nonionina), and to study their org

The animal is soft, internal, covered by the spiral concamerated shell, and without prehensile tentacles at the mouth. Through perforations in the shell minute extensile filamentous tentacula larger bundles of these appear about the umbili shell.

The last, sometimes the 2-4 following ones, co parent parts only. The others are filled with two coloured larger organs. One of these is the spiral canal expanded in each chamber, contracted at ea tion (to an aperture in the septum); the other is gr is perhaps an ovarian mass.

By dissolving the shell in weak acid the shields o swallowed as food became visible in all parts of the canal. There are no pulsating vessels. Ehrenbe to regard one of these animals as a compound co the other as a single coral animal—the former com from chamber to chamber by many small apertures in the other by one.

In a fossil state the shells of Rotalia show the m forations through which the pseudopodous tentacu and by a careful examination of the remains of th embalmed in flint Dr. Mantell (*Medals of Geolo* p. 282) has shown the general internal arrangeme shell, and general form, if not the minute organisati

tant. In a recent communication to the Geolo-
of London, this author has more distinctly ex-
pinion that the soft body of Rotalia is actually
distinguishable by colour from the clearer flint
placed the shell.
n of the fossil Foraminifera to the recent types is
than that of most other tribes. It appears not
eral tertiary forms are identical with living spe-
ier, according to Ehrenberg, that no less than
Foraminifera of the chalk are undistinguishable
species. The following is the list of those
he localities where they occur in real chalk :—

gerina bulloides	Denmark.
gerina helicina	Cattolica.
ina globularis	Gravesend.
ia ocellata	Cattolica.
ia globulosa	Rügen.
ia perforata	Cattolica.
ia turgida	Gravesend.
laria aciculata	Brighton.
laria globulosa	Rügen.
lina cylindracea	Paris.

ne doubt must remain as to the exact identity of
forms thus declared to occur, both recent and
beds, the analogies are too close and too numerous
sitation in admitting that the Foraminiferous races
zoic and Cainozoic periods have more decided
appears in any other group of organic life. As
olypiaria of the Silurian series pass upwards into
era, some of the Foraminifera of the chalk, with
itrea and T. Caput Serpentis, appear to reach our
d thus by feeble, but not to be neglected links,
f antient and modern life are united into one
discontinuous series, the seeming interruptions
higher grades of life, the less striking connexions
by the simpler marine organic structures which
survive great physical catastrophes and better
sive variations in the condition of the sea.

ne Mountain Limestone, forming the centre of an oolitic grain.
Power 120. (Original.)

nifera of the Chalk, obtained by brushing it in water.
Power 120. (Original.)

, PATRICK, Bishop of Aberdeen, was born
e middle of the sixteenth century. He was the
the proprietor of Corse, in the county of Aber-
his descendants still possess estates. He studied
nd Glasgow. His first clerical appointment was
Morayshire. He became bishop of Aberdeen in
lied in 1635 He was the author of several
polemical works, which were collectively published in Latin at Amsterdam, in 1646. A curious collection of funeral sermons on his memory, by many eminent survivors, was published soon after his death.

(Irving, *Lives of Scottish Writers*, ii., 43-47; *Funerals of Bishop Forbes*; reprinted for the Spottiswoode Society.)

FORBES, WILLIAM, Bishop of Edinburgh, was born at Aberdeen in 1580. He studied at Marischal College in Aberdeen, which he entered when he was twelve years old. He held for some time a chair of logic in Aberdeen; and afterwards travelled in Germany and Poland, studying at Helmstädt and Heidelberg. On his return to Britain he was offered a professorship of Hebrew in Oxford, but the state of his health induced him to return to his native country. In 1618 he was made principal of Marischal College. We find him in 1621 ceasing to hold this office, and soon afterwards becoming one of the ministers of Edinburgh. In that capacity he preached before Charles I. on his visit to Scotland in 1633, and the eloquence he then exhibited is said to have induced the king to resolve that he should be the first bishop of Edinburgh. That short-lived see was erected in the ensuing year, and Forbes was appointed bishop on 26th January, 1634. He died on the 11th of April of the same year. His fame is chiefly traditional. His only published work is posthumous: 'Considerationes modestæ et pacificæ Controversiarum de Justificatione, Purgatorio, Invocatione Sanctorum et Christo Mediatore, Eucharistia,' published in 1658. It embodied a proposal for an accommodation between the Protestant Episcopal churches and the Church of Rome likely to have made episcopacy more unpopular in Scotland than it was. Some other polemical works which had raised high expectations were lost. Burnett, characterizing his eloquence, says that 'he preached with a zeal and vehemence that made him forget all the measures of time—two or three hours was no extraordinary thing for him.'

(Irving, *Lives of Scottish Writers*, ii., 1-9.)

FORBES, JOHN, a divine and polemical writer, second son of Patrick Forbes, Bishop of Aberdeen, was born on the 2nd of May, 1593. He studied at Heidelberg and Sedan, and returned to Scotland in 1619. In that year he was appointed professor of divinity in King's College, Aberdeen. 'In this important vocation,' says Dr. Irving, 'he laboured with great diligence, and speedily acquired the character of a most able and useful teacher. He was profoundly skilled in ecclesiastical antiquity; and not contented with delivering what is called a system of divinity, he exhibited a very elaborate deduction of the progress of Christian doctrine in various ages of the church.' He lived during the period of the hottest struggles for supremacy between Episcopacy and Presbyterianism; and possessed with the views of toleration and ecclesiastical peace that appear to have distinguished his family, he published in 1629, at Aberdeen, 'Irenicum Amatoribus Veritatis et Pacis in Ecclesia Scotiana.' Afterwards, in 1638, when the breach between the two parties, which was the commencement of the civil wars, had begun, he published 'A peaceable Warning to the subjects in Scotland.' He was afterwards a leader in a polemical dispute as one of those generally styled 'the Aberdeen doctors,' who conducted, on the side of Episcopacy, a controversy with the Covenanters. Whichever party may have had the advantage in argument, the latter had the superiority in physical force; and after having seen his coadjutors deprived of their benefices, Forbes was subjected to the same fate in 1640. His case was one of peculiar hardship, for he had made over part of his own private property to be attached to the professorship which he held; he lost this property on being dismissed from his office. In 1644 he went to Holland, where he married a Dutch woman named Soete Roosboom, or Sweet Rosetree. He returned to Aberdeen in 1646, and died on the 29th of April, 1648. Besides the works already mentioned, he published others on kindred subjects, some of which passed through more than one separate edition; and the whole, along with some posthumous additions, were collectively published in his 'Opera Omnia,' at Amsterdam, 2 vols. folio, 1702-3.

(Irving *Lives of Scottish Writers*, ii. 46-54; *Funerals of Bishop Forbes*, reprinted for the Spottiswoode Society.)

FORCING-ENGINE. [FIRE-ENGINE, P. C.]

FOREST MARBLE, one of the upper beds of the Bath oolite series.

FORLI, MELOZZO DA, a celebrated painter of Forli, where he was born about 1436. Melozzo was the first who ventured to foreshorten figures upon ceilings, to attempt the *sotto in su* as it is termed by the Italians, and in which Correggio has obtained so great a name; Melozzo however was scarcely inferior in this respect to that great painter. He excelled generally in perspective; in a work published in 1494, by Fra Luca Paccioli, entitled 'Summa d'Aritmetica e Geometria,' he is enumerated among the living painters who were *famosi e supremi* in perspective.

Scarcely anything is known of Melozzo, though his contemporaries termed him 'the incomparable painter, and the splendour of all Italy.' (Morelli, *Notizia d' Opere di Disegno*, &c., p. 109.) He is supposed by some to have been the fellow-pupil of Mantegna with Squarcione at Padua, and by others to have been the scholar of Piero della Francesca, one of the earliest masters of perspective. He was early in Rome: he is noticed by Vasari as the contemporary of Benozzo; he painted there, in 1472, for Cardinal Riario, the nephew of Sixtus IV., an Ascension of Christ, on the altar vault of a chapel of the church of the Apostles, Santi Apostoli, which was sawed out and removed in 1711, the principal part to the Quirinal Palace, and part to the Vatican, which is now in the sacristy of St. Peter's. The part in the Quirinal, the Ascension, has the following inscription—'Opus Melotii Foroliviensis, qui summos fornices pingendi artem vel primus invenit vel illustravit, ex abside veteris templi SS. XII. Apostolorum huc translatum anno Sal. MDCCXI.' All the fragments are engraved in D'Agincourt's 'Histoire de l'Art par les Monumens.' There is also a large fresco, now mounted on canvas, in the gallery of the Vatican, which was formerly on a wall of the old Vatican library; it represents Sixtus IV. installing (Bartolomeo Sacchi, or) Platina in 1475, as prefect of the said library. The fresco was removed from the wall and fixed to the canvas by Domenico Succi of Imola, by order of Leo XII. The expression of all the heads, mostly portraits of distinguished persons, is good and individual, and the general arrangement and colouring are of great merit, but in the severe style of Mantegna and other eminent *quattrocentisti*.

(Vasari, *Vite de' Pittori*, &c., in the life of Benozzo (Gozzoli); and the notes to Schorn's German translation; Lanzi, *Storia Pittorica*, &c.; *Galleria di Quadri al Vaticano*, Roma, 1836.)

FORMATION, a geological term subordinate to 'system,' and including special 'groups,' or assemblages of strata; in a looser sense it applies also to pyrogenous rocks, and mineral veins.

FORTEBRACCI. [Braccio Fortebracci, P. C. S.]

FOSBROKE, REV. THOMAS DUDLEY, has given a sketch of part of his life in a notice prefixed to the original *quarto* edition of his 'Encyclopædia of Antiquities,' published in 1824; and he has entered into some details about his ancestry, both in that paper, in his 'Abstracts of Records respecting the County of Gloucester,' 1807 (vol. i. p. 407), in his work entitled 'Ariconensia,' 1821, p. 168, and in an account which he left in the hands of a friend, and which has been prefixed to the third and posthumous edition of his 'British Monachism,' 1843. There is also a full memoir of his life prefixed to the last-mentioned publication; being the same, or nearly the same, which had previously appeared in the 'Gentleman's Magazine' for February, 1842.

Thomas Fosbroke, the only child of Mr. William Fosbroke, whose progenitors for several generations had been clergymen, was born in London, 27th May, 1770. He was educated at St. Paul's school, whence he was elected in 1785 to a Teasdale scholarship at Pembroke College, Oxford. He took his degree of M.A. in 1792; and was the same year ordained deacon, and settled in the curacy of Horsley, in Gloucestershire, which (having been ordained priest in 1794) he held till 1810, when he became curate at Walford in Herefordshire. He was presented to the vicarage of Walford in 1830; and he died there on the 1st of January, 1842.

Mr. Fosbroke first made himself known as an author in 1796, by the publication of a poem entitled 'The Economy of Monastic Life, as it existed in England, with Philosophical and Archaeological Illustrations,' 4to. It is in the Spenserian stanza, but in the style, as well as in the title, it was intended, it seems, as an imitation of Darwin's 'Economy of Vegetation.' It is reprinted at the end of the third edition of his 'British Monachism.' That work, the full title of which is 'British Monachism, or Manners and Customs of the Monks and Nuns of England,' first appeared in 2 vols. 8vo. in 1802; a second edition, much enlarged, was published in one volume, 4to. in 1817; and since the author's death a third in one volume, 8vo. has been brought out under the care of his son,
the Rev. Tate Fosbroke, Vicar of St. Ives; Lond
1807 he published by subscription two volumes 4
stracts of Records and MSS. respecting the
Gloucester,' forming a contribution of raw mate
county history. In the 'Biographical Dictionary
Authors,' 8vo., London, 1815, we are told (at p. 1
1809 Mr. Fosbroke published, in 8vo., a 'Lett
Canning on his uncandid Abuse of the Duke of
afterwards, at p. 431, the letter is stated to have bee
not upon Mr. Canning (who indeed never abuse
of York) but upon the opposition; and it is adde
this pamphlet there were only fifty copies printed.
mentioned in the memoir published by Fosbrok
That memoir (which is loosely drawn up) state
after his removal to Walford, in 1810, he illustra
published statues in Mr. Hope's collection; but
be the precise meaning of that we do not know.
time Mr. Fosbroke was much incommoded by the
of Sir Richard Phillips, the publisher, for whom h
considerable progress in compiling a work to be
Archaeological Dictionary. In 1814 he publish
to the New Testament, or Whitby's Commentary
in 1819, 'An Original History of the City of
8vo.; in 1820, 'The Wye Tour, or Gilpin on
8vo., several times reprinted; in 1821, 'Ari
Archaeological Sketches of Ross and Archen
and in 1821, 'Abstracts and Extracts of Smyth's
of the Berkeleys.' He had also before this writt
mar of Rhetoric,' which is stated to be the sa
published in the collection called Pinnock's
His principal work, 'The Encyclopædia of Ant
Elements of Archaeology,' came out by subscripti
4to. in 1824; and a second edition, in 1 volum
peared in 1840. It was followed by a 'Pict
Topographical Account of Cheltenham and its v
1826; 'The Tourist's Grammar,' 12mo., the sa
'Foreign Topography, or an Encyclopediac Ac
betically arranged, of the antient remains in Asia
Europe, forming a sequel to the Encyclopædia of
4to. 1828. His narrow circumstances were some
by his being elected, in 1827, an honorary as
Royal Society of Literature, which brought him
of 100*l.* a-year till the royal bounty was withdr
Society in 1831. To the first volume of the T
the Society of Literature he contributed a p
'Extracts from MSS. relative to English History
second volume, 'Illustrations of the Constitution
Parliaments.' He was also a regular correspo
Gentleman's Magazine for several years previous
nation of the original series of that work in 183
stated to have left prepared for the press 'A N
ginal Synopsis of antient English Manners, C
Opinions, derived from Old Chronicles, &c.,' whi
has not yet appeared.

Mr. Fosbroke possessed a considerable kn
English antiquities, and also of general archaeo
study of which departments of inquiry he had sp
and his 'Encyclopœdia of Antiquities' and 'Br
chism' are convenient books, though rather of ref
of authority. He had no accurate learning; and h
and acuteness were about on a level with his schol
his books are rather popular compilations than
higher.

He married, in 1796, Miss Howel of Horsley,
had four sons and six daughters. Seven of his
survived him.

FOSCARI'NI, MARCO, born in 1698, of an o
family of Venice, which has produced many di
men, studied at Bologna, after which he was e
official situations in the service of his country.
was sent Ambassador to the emperor Charles VI
mained at Vienna for several years, and he had
task of maintaining the neutrality of Venice during
1733-35 between the French and the Austrians on
of the Polish succession. He there wrote an int
count of the court of Vienna, its politics, and its adm
especially of its Italian dominions, in which he
the latent causes of the sudden reverses which the
experienced in that campaign, and by which th
kingdoms of Naples and Sicily. This work ha
inedited until lately, when it was published by J.
seux, at Florence, in 1843: 'Storia Arcana ed
inediti di Marco Foscarini,' 1 vol. 8vo., forming

of inedited or rare Italian historical works, entitled ivio Storico Italiano,' which are being published under perintendence of a society of learned men in Tuscany. the merits of Foscarini as an historian is his conscien- ss and love of truth.

r his return from Vienna, Foscarini was sent ambas- to Rome, and afterwards to Turin, where he supported inciple of neutrality adopted by the Venetian senate the war of the Austrian succession. In his various sies he compiled, according to the custom of the Vene- iplomatists, well digested 'relazioni,' or reports, not his personal transactions with foreign statesmen, but what he had observed and learnt concerning the poli- principles and views of the various courts of Europe. whilst he adhered, according to his instructions, to the n of strict neutrality cherished by the Venetian senate, rned his employers of the necessity of being prepared contingencies amidst the change that was taking place relative position of the great powers of Europe—a warn- hich, had it been attended to, might have saved Venice century later.

his return from his Turin embassy he was appointed rmatore dello Studio di Padova,' or superintendant of niversity, in which he effected useful reforms and im- ments. About this time he delivered in the Great il of Venice an oration, in recommendation of the re- of an antient custom of sending from time to time extra- ry inspectors into the province of Dalmatia for the e of discovering and correcting the abuses that had into the administration of that important but long cted country. And this motion was carried. His ora- vas published long after his death, at Venice, in 1831, illustrations by Cicogna: 'Della Necessità di spedire sitori di Stato in Dalmazia, Orazione inedita di Marco rini.' In 1752 he published the first volume of his his- of Venetian literature: 'Della Letteratura Veneziana otto, di Marco Foscarini, Cavaliere e Procuratore, volume ,' fol. Padova, 1752. This work, which was considered a model of literary history, established the reputation of rini as an author. The first four books treat of the tian writers on law, the old chroniclers, the historians of ce, and the Venetian writers on the history of other ries, including travellers. The remaining four books to treat of the writers on mathematics, geography, and ostatics, those on the art of war and navigation, and the rhetoricians and orators. This second part of the however has remained unfinished and unpublished. style of the work is concise and dignified, and the au- ies are carefully quoted and discussed in copious notes. hini has published a sort of continuation of the work 'Della Letteratura Veneziana del Secolo XVIII.'

May, 1762, Foscarini was elected doge, but his tenure t dignity was short, for he died in the following March, generally regretted. He was one of the last distin- ed statesmen of Venice. He left a rich and very select y of books and MSS., which was sold after the fall of e in 1799. The Emperor of Austria purchased the tion of MSS. for 10,800 livres, and they are now in the ial library at Vienna. A catalogue of the historical part collection, which consists of nearly 400 MSS., is given end of the Storia Arcana noticed above, together with etters of Foscarini, 'on the manner of writing history.'

MSS. were among the materials by the aid of which arini compiled his history of Venetian literature. Many em are very valuable for the history of Venice. Ranke made use of some of them in his history of the popes. des the works mentioned in the course of this article, al minor productions of Foscarini have been printed, such oration delivered in the Great Council in support of the tution of the Council of Ten; his report of his Turin assy, which gives much valuable information concerning Sardinian monarchy, and which was published in the first me of the 'Mercurio Italico' in London, and was repub- d with comments by Cibrario in 1830; a 'Discorso sulla ssità della Storia e della Facoltà del ben Dire per gli ini di Repubblica,' published at Venice in 1819; and er, 'Intorno ai metodi e alla forma della Veneta Repub- .' A number of Foscarini's writings remain inedited in the y 'del Seminario' at Venice, in the library of St. Mark, d his own collection now at Vienna. Ludovico Arnaldi thers wrote biographical notices of Foscarini at the time of eath; and Professor Sibiliato, of Padua, wrote an oration, rno all' Eloquenza del Foscarini.'

(Tipaldo, *Biografia degli Italiani Illustri del Secolo XVIII.*; Preface to the *Storia Arcana* of Foscarini.)

FOSCHI'NI, ANTONIO, was born June 16th, 1741, at Corfu. This able architect—who, we may observe, is omitted in Nagler's 'Künstler-Lexicon'—was the son of Ferrarese parents, and always called himself a native of Ferrara, because he had been brought up from his infancy in that city. His first professional studies were directed by his father chiefly towards engineering and hydraulics, but his own taste pointed out architecture as a more congenial pursuit, and to that he applied himself not only with diligence, but with the earnest desire of reforming the various abuses and correcting the bad taste which for nearly two centuries had corrupted the art in Italy. Appointed to the professorship of architecture when Clement XIV. endeavoured to restore the University of Ferrara to its former splendour, he laboured to impress upon the students the importance of attending to those fundamental principles which had been more or less disregarded or lost sight of, through aiming at superficial novelty without any freshness of invention for its basis. Yet greatly as his reputation increased, it did not shield him from the calumnies and intrigues of enemies, who succeeded in at length dispossessing him of his office. He was afterwards nominated, in 1804, to a similar professorship in the university of Pavia, not only without solicitation, but so contrary to his own wishes, that, flattering as the offer was, he rejected it. In like manner he refused the overtures made to him both from Vienna and Rome, although they opened an equally lucrative and distinguished career to him. His attachment to Ferrara, joined to his indifference for wealth, prevailed over all other considerations. Ferrara was the home of his affections, and he remained there till his death, December 14th, 1803.

The list of buildings executed by him, which claim notice as works of architecture, is by no means a long one: the greatest and most admired of them was the theatre at Ferrara, reputed one of the most spacious, well-arranged, and elegant structures of its kind in all Italy. It should be observed, however, that it is said to have been originally begun by the celebrated Cosimo Morelli [MORELLI, P. C. S.], Foschini afterwards improving upon his designs. What would have added both to his own renown and that of Ferrara, was his design for completing the great tower of the Duomo, which, had it been realized, would have rendered it one of the loftiest in Europe, but the want of adequate funds caused the project to be laid aside. Unfortunately, too, neither that nor any other of the numerous designs and manuscript treatises on architecture which he left at his death, have ever been published—a circumstance by far too common with those of his profession to occasion any surprise, however much it may cause regret. The fame of the theatre at Ferrara brought him commissions for designs for others from Vienna, Verona, and Ancona; but, rather strange to say, he appears to have declined them: at any rate the only other theatre known to have been executed, if not by him, from his designs, is the one at Lendinara. The great Hospital at Commachio is another edifice by him; and shortly before his death he was engaged in preparing designs for a basilica or large church at Bandeno, in the territory of Ferrara.

FOSSA'TI, DOME'NICO, born at Venice in 1743, was the son of Giorgio Fossati, who, besides practising as an architect, was also a painter and engraver. The elder Fossati may also claim to be considered an author, having published in 1747 an Italian translation of Felibien's 'Lives of Architects,' a second edition of which appeared in 1755. Gifted with a fertile imagination, and delighting in the poetic effects which architecture is capable of producing, Domenico chose for himself a walk of art which, although generally looked upon as a secondary one, enabled him to *improvise* at will the most splendid conceptions, quite unchecked by either utilitarian or necessitarian considerations. Having finished his studies, he commenced scene-painter, and was abundantly employed not only as such, but in adorning various palaces and churches with architectural and other decorative painting. On the Teatro di San Benedetto in Venice being burnt down in 1775, he made a model for a new edifice; yet greatly as it was admired, it was not adopted, on account of being found too expensive. He however painted a great deal of the scenery for the new theatre, as he afterwards did for those of San Samuele and San Luca in that city. When Venice was visited by Pius VI., and by the Grand Duke and Duchess of Russia in 1782, Domenico and his father had the charge of getting up the splendid preparations made in honour of those high personages. Nor was Venice the only field of his talents: he resided some time at

Udine, where, besides painting for the theatre, he was employed in decorating several palaces; after which he was engaged successively at Padua, Vicenza, and Verona, one of his most important performances being the ceiling of the church of Martellago. Those labours terminated, he went to Milan, and assisted Piermarini [PIERMARINI, P. C. S.] in the internal decorations of the theatre of La Scala, then just erected; after which he painted for the theatre at Monza, and that at Gratz, and while at the latter place received invitations from both Rome and St. Petersburg. He was however induced by his friends to decline them, and to return to Venice, but there a disaster awaited him which neither they nor he could foresee. He had just finished painting a ceiling in the Palazzo Contarini, and was standing upon the scaffold with some of his assistants, when a workman incautiously removed one of the props, and all were precipitated to the ground. The only one who received any serious injury was Fossati, who broke his leg, and died in consequence, within less than a month afterwards, August 15, 1784. He left a great number of drawings, consisting of original designs, studies and sketches, which came into the possession of his nephew Pierangelo, son of his brother Giuseppe, which brother was an architect and engineer in the service of the King of Naples.

FOSSOMBRO'NI, VITTO'RIO, born in 1754, at Arezzo in Tuscany, of a noble family, studied at Pisa, and applied himself especially to the mathematical sciences, for which he showed a particular aptitude. In 1782 he was appointed, by the Grand-Duke Leopold I., inspector of the property of the military order of S. Stefano, and in 1785 he was made commendatary of that order. In 1792 he was consulted by the Grand-Duke Ferdinand III. on the subject of the corn-trade and corn-laws, upon which he wrote a treatise, which has not been published. In 1794 he was appointed hydraulic superintendent of the Val di Chiana. Fossombroni had previously studied the ground attentively, and had written a learned treatise on the causes which had led to the encroachment of the waters over that low but fertile district, and had pointed out the means of draining the country: 'Memorie Idraulico-storiche sopra la Val di Chiana,' 1789. He promoted the works for that object, which having been continued through a succession of years, have at last restored the valley of the Chiana to fertility and salubriousness. In 1796 Fossombroni was appointed Minister for Foreign Affairs of the Grand-Duke of Tuscany. When the French took violent possession of the country in 1799, Fossombroni accompanied his master to Vienna, where the grand-duke gave him leave to return home to attend to his own affairs. After Tuscany was transformed into a kingdom, the new queen of Etruria appointed Fossombroni in 1804 member of the Commission of Finance. In April, 1805, he was sent, jointly with the Prince Corsini, to Milan, to compliment Napoleon on his assumption of the crown of Italy. When Tuscany was annexed to the French empire, Napoleon made Fossombroni a member of the Legion of Honour, and appointed him president of the commission for the improvement of the Campagna of Rome and the drainage of the Pomptine Marshes, on which he wrote a report for the emperor. On the restoration of the Grand-Duke Ferdinand to his paternal dominions, Fossombroni was one of the first persons employed in the new ministry. He was made president of the legislative commission, councillor of state, minister for foreign affairs, with the presidency of the other departments of the government. These offices he retained till his death, which took place in 1844, when he was ninety years of age, having retained all his mental faculties to the last. In 1832, when he was seventy-eight years of age, he married a lady of a noble family of his native town, Arezzo.

Besides the works already mentioned, Fossombroni published the following works on hydraulics: 1. 'Memoria sopra la Distribuzione delle Alluvioni;' 2, Memoria sulla Resistenza ed Urto dei Fluidi;' 3, 'Illustrazione di un Antico Documento relativo all' originario Rapporto trà le Acque dell'Arno e della Chiana,' 1826; 4, Memoria sulla Relazione trà le Acque dell' Arno e quelle della Chiana,' 1839. In these last two papers he explained the remarkable change that has taken place in the course of ages in the declivity of the bed of the Chiana, which in antient times afforded a water communication between the Arno and the Tiber. [ARNO, P. C.] He also adverted to the danger to which the city of Florence and the surrounding country were exposed, in consequence of the alluvial deposits which are carried by the Chiana and numerous other streams into the Arno, and which tend to
raise the bed of the Arno; 5, Saggio sulla Bonifica
Paludi Pontine;' 6, 'Memoria sul Lago di Fucecchio,
marshy district of Tuscany, in the valley of the Lo
7, 'Relazione sopra l'Incanalamento di un Tronco
Arno;' 8, 'Memoria sulle Maremme Toscane;'
moria sopra la Inclinazione Artificiale.' Fossombro
numerous other memoirs on hydraulic subjects, whi
edited; among the rest, a memoir on the lagoons o
for the Emperor of Austria, which has been use
works which are now in progress in that quarter, a
memoir for Mehemet Ali, Pasha of Egypt, conce
construction of a basin at Alexandria. Fossomb
wrote several treatises on mathematics and mechani
others a 'Saggio sopra il Moto degli Animali e so
porti;' a treatise 'Sopra la Misura delle Forze M
another, 'Sopra la Valutazione della Forza e degli
and a 'Memoria sopra il Principio delle Velocità
published in 1796, and which was highly praise
grange, Lacroix, Laplace, and other eminent mathe

As a statesman, Fossombroni was enlightened a
judiced. Jealous of the independence of his nativ
he asserted its rights upon every occasion during the
occasionally critical period of his administration;
tained the freedom of commerce, which has grea
buted to the prosperity of the country; he advoca
tion of opinions, and he strove to render Tuscany
a paternal but enlightened government. His syste
to have been to govern without bustle and noise, to
move on with as little apparent interference as possi
part of the governing powers, a task in which he w
by the disposition of the people, the smallness of
and by his own temperament. He may have been
by some for being too tolerant, and by others for
bold or active enough; but in these matters our
ought to take into consideration the condition of
and the circumstances of the country. One thing
admitted is, that under Fossombroni's administratio
has been the happiest country in Italy.

(*Rivista Ligure*, and other Italian journals for 18
munications from Italy, and the works of Fossombr
above.)

FOSTER, REV. JOHN, was born in the yea
Yorkshire. At an early age he attracted the not
late Dr. Fawcett, baptist minister, of Hebden Br
Halifax, in Yorkshire, by whose interest he was
student of the Baptist college, Bristol, where he st
under Dr. Evans and afterwards under Dr. Rylan
he had completed his studies he became a preacher,
a course of several years was successively settled
various places, the last of which was Downend, ne
He then relinquished the active duties of a ministe
the last eighteen or twenty years of his life resided
ton, near Bristol, chiefly occupied in literary occupa
preaching only occasionally. He was for many ye
quent contributor to the 'Eclectic Review,' in whic
article appeared in November, 1806, and his last in
1839. He died at Stapleton, Oct. 15, 1843.

Foster's reputation as an author is chiefly founde
'Essays,' which were first published in 1805, in the
series of letters, which, though intended for publicati
really addressed to the lady who soon afterwards be
wife. The 'Essays' are on the following subjects:—
a Man's writing Memoirs of himself;' 2, 'On De
Character;' 3, 'On the application of the epithet Ro
4, 'On some of the Causes by which Evangelical
has been rendered unacceptable to Persons of
Taste.' The only other work which he published in
rate form, was 'An Essay on the Evils of Popular Ig
which grew out of the topics of a discourse delive
public anniversary meeting in aid of the British and
School Society, and which he afterwards expande
volume of moderate size. To the 'Eclectic Review'
tributed altogether 185 articles, of which 50 were
and published in a separate form in 1844. A v
lectures, edited from Foster's notes by his friend Mr.
Ryland, is said to be in the course of preparation.

John Foster's writings occupy only a small space,
are of great merit. The 'Essays' have now (18
through eighteen editions, and their popularity see
rather increasing than diminishing. Foster's intelle
high order, clear, comprehensive, and of strong gr
displays an intimate knowledge of the various forms
character, draws his remarks from a wide extent of

ervation as well as a large acquaintance with books, and ntirely free from party views or sectarian feelings. His ghts are unborrowed, his morality high and pure, and views, whether relating to public government or private uct, are independent, lofty, and liberal. His composi- is very elaborate, yet natural and graceful; it has no ap- ance of having been modelled on the style of any other r, but always seems to flow with the unrestrained current thoughts, generally with a tendency towards expansion, ften concise, nervous, and impressive.

e 'Essay on the Evils of Popular Ignorance' consists of ies of arguments on the necessity of a comprehensive me of popular education. It is very powerfully written. ome of the editions is annexed his sermon in defence of stian missions, which is much admired.

ster was eminently qualified for a reviewer, as well as an ist. His strong good sense, his wide range of know- from books and observation, his perfect independence of , power of sarcasm as well as of eulogy, pure taste, and ctive style, all contributed to fit him for sitting in judg- on works of general literature.

person Foster was rather above the middle size. His tenance was handsome and striking. His social character scribed as having been very attractive. His range of s in conversation was extensive, embracing not only such ects as those treated of in his writings, but including the arts, of which he was an enthusiastic admirer, and almost y department of antient and modern literature.

Gentleman's Magazine, Jan. 1844; *Eclectic Review*, Feb. May, 1844.)

OULSTON, JOHN. The name of this architect, who at Plymouth, January 13th, 1842, aged sixty-nine, is cially connected with the history of that town and its hbourhood, where, during the last thirty years of his life, enjoyed a very extensive practice, and executed nearly the public buildings then erected at Plymouth and Devon- (formerly Plymouth Dock), besides various general im- vements, such as streets, and lines of uniformly built ses, distinguished by the name of 'Terraces.' Hence he e to be regarded as *the* architect *par excellence*, and has n complimented by the title of the 'Wren of Plymouth,' ugh that of its 'Wood' [WOOD, P. C.] would have been pliment sufficient. That he did much for the general earance of Plymouth and the places in its vicinity, is to be disputed: he introduced an improved style of ding; but those of his buildings which challenge notice istinct works of architecture exhibit little more than a tering of style—those superficial and obvious rudiments which at once distinguish one style from another. In critical meaning of the term, he himself possessed no , for, applied to the works of an artist, *style* presumes individuality and generality of expression in that parti- language of his art which is employed by him; whereas ston's Greek was little more than the neutralization of k, followed in literal transcripts from it with respect to nniation, columns, and a few details, but essentially un- k, or pseudo-Greek, in regard to general character. His s in that style are however characteristic of their time, serve to show what was admired in this country as genuine 'pure' classical architecture during the early part of the ent century, when *four-columned* Parthenons *without* sculp- and *with* sash-windows were hailed as marvels worthy of ens itself. When compared with many things of the date, even in the metropolis, Foulston's Greek ought to fy us as being very good; indeed, the criticism which ls the Post-Office in London as a classical and chaste of architecture, may without scruple profess quite as h admiration for the façade of the Royal Hotel at Ply- th, more especially as the latter has an octostyle portico, le the other is only hexastyle. The general resemblance he two buildings is remarkable, for not only might they s for being the work of the same architect, but for slightly rked variations of the same design. The coincidence how- r is no more than a very natural one, the same very ited system of composition being adopted for both—that rein *columniation* is made the centre of what, being lar [ASTYLAR, P. C. S.], is characterized solely by *fene- tion*. At all events, no suspicion of plagiarism can attach oulston, as his building was erected before the other.

ith the exception of Soane and Laing, Foulston was the one among his contemporaries who published designs of buildings executed by him. The collection was at first unced as intended to consist of 200 plates, in 4 volumes, 4to.; but it appeared, in 1838, in a single volume, with 116 plates in lithographic outline, executed in a far more hard and formal than tasteful manner. As architectural illustration, the work is remarkably full and precise, even superabundantly so, many of the drawings consisting only of details of Doric and Ionic orders of the plainest description, as if lessons of that kind were needed, or not to be found in a hundred elementary works. Yet, though no fewer than forty-seven plates are devoted to a single edifice, comprising the Royal Hotel and Theatre, there is neither section nor view to give any idea of the theatre itself, but only drawings explanatory of the carpentry and construction of the stage. However, that publication enables us to do what, highly desirable as it is, is generally most difficult of accomplishment in architectural biography, to give a tolerably full and accurate list of Foulston's buildings. At Plymouth:—Royal Hotel and Theatre, begun 1811, Grecian Ionic; Exchange, 1813; Athenæum, 1818-19, Grecian Doric; St. Andrew's Chapel, 1823; Public Library. Devonport:—Town Hall, 1821-2, Grecian Doric; Civil and Military Library, 1823, Egyptian; Mount Zion Chapel, 1823-4, Hindoo; Column, 1824, Grecian Doric. Tavistock, Old Abbey Buildings restored, 1829. Torquay, Public Ball-room, 1839. Bodmin, Cornwall County Lunatic Asylum, 1818. Besides the above, which constitute his edited designs, Foulston executed several other buildings, public as well as private, including St. Paul's Chapel, Gothic, and Edgecumbe Place, at Stonehouse; St. Michael's Terrace, Stoke Damerell; Belmont House; and various villas and cottages in the neighbourhood of Stoke, and in other parts of the county. Greatly as he seems to have prided himself upon the correctness and purity of his taste in classical architecture, Foulston was by no means disposed to confine himself to the Grecian style, for he attempted every style in its turn, Egyptian and Hindoo not excepted, and even that of Soane included, St. Andrew's Chapel being so truthful a sample of Soane's style, that it might very well pass for the production of Sir John Soane himself in the very extreme of his peculiar manner. The fact is, Foulston seems to have discovered that he had exhausted all his stock of ideas for Grecian designs after employing that style for some of his principal works. It would not do to repeat Grecian Doric and Ionic porticoes, and those mere monoprostyle ones, perpetually, especially in contiguous buildings, and this, no doubt, determined him not only to have recourse to other and widely different styles, but occasionally to bring them together in direct contrast with each other, as at Devonport, where in the Town-Hall, Column, Library, and Chapel, he clustered together into one group Grecian, Egyptian, and Hindoo, the two last of a very spurious kind, one of them being evidently borrowed from the building in Piccadilly, while for the Hindoo there seems to be no better authority than the architect's so naming it. The two first-mentioned structures are, on the contrary, highly creditable to Foulston's taste: the Town-Hall presents a Doric tetrastyle (forming the entire front), placed as a monoprostyle to, or in advance of, a deeply recessed loggia, within which is a flight of steps (not however extending the whole width of the recess) leading up to the door, which is placed upon a sort of landing, and which is the only aperture within the portico, there being fortunately no windows. Though without more pretensions to design than many other things of the kind that have been erected all over the country, the Devonport Column stands with an air of very unusual dignity, not merely stilted upon a pedestal borrowed from the broken stylobates of Roman and Italian architecture, but rearing itself upon a lofty substructure of masonry, the whole being on a higher level than the pavement of the street. Yet we suppose the Royal Hotel at Plymouth generally passes for Foulston's *chef d'œuvre*, it being his largest building—one rivalling the post-office at London in size, as well as resembling it in design; for the Plymouth structure measures 268 by 218 feet, the other 390 by 130 feet, and therefore it is even somewhat larger in plan, the respective areas being 58,424 and 50,700 square feet. It is also, like the London one, an insulated edifice; but unfortunately the principal front, with its Ionic octastyle, faces the north, and consequently, as that portico is only a simple monoprostyle not even recessed, it produces comparatively little effect, the sun very seldom striking upon it. There are two other porticoes to the same building, both of them Ionic tetrastyle, and placed in the same front; but as it happens to be the east one, they again have not the advantage of much sun; besides which, that façade makes no composition, there being no central feature between the two porticoes, nor are they so placed as to form the extremities of the general mass.

There is a portrait of Foulston, apparently a strong likeness, prefixed to the above-mentioned collection of his designs.

FOUQUIERA'CEÆ, a natural order of plants belonging to Lindley's syncarpous group of polypetalous Exogens. The species are trees or shrubs, with entire oblong fleshy clustered leaves seated in the axil of a spine or a cushion, with scarlet flowers arranged in a terminal spike or panicle. The sepals are five, imbricated, ovate, or roundish; the petals 5, regular, combined in a long tube, arising from the bottom of the torus or calyx; the stamens 10 or 12, arising from the same line as the petals, but distinct from them, exserted; the anthers 2-celled; the ovary superior, sessile; the style filiform, trifid; the ovules numerous; the capsule 5-cornered, 3-celled, 3-valved; the valves bearing the dissepiments in the middle; the seeds in part abortive, compressed, winged, affixed to the axis; the embryo strait, in the centre of thin fleshy albumen; the cotyledons flat. This order was separated by De Candolle from Portulaceæ for the following reasons:—'1, because the petals were in a long tube of the same nature as that of gamopetalous Crassulaceæ; 2, because the capsule consists of three loculicidal cells, that is to say, which separate through the middle, forming three septiferous valves; and, 3, because the embryo is straight, with flat cotyledons, and stationed in the centre of fleshy albumen.' (Lindley, *Nat. System.*) In the structure of their flowers Fouquieracæ resemble Crassulaceæ; and in the character of their fruit, Loasaceæ, Turneraceæ, and Stackhousiaceæ.

There are only two genera comprehended in this order: *Fouquiera*, named after Dr. Peter Edward Fouquiere, a professor of medicine at Paris; *Bronnia*, named in honour of Henry George Bronn, who has written on leguminous plants. Each of these genera has a single species: both plants are natives of Mexico. Of their properties little is known.

F. formosa is a showy shrub, and may be grown in a light rich soil, and propagated by means of cuttings, which will root freely in sand under a hand-glass in heat. Bronnia has been referred by some botanists to Tamaricaceæ.

(Lindley, *Natural System*; Burnett, *Outlines of Botany*; Don, *Gardener's Dictionary*.)

FOURIER, CHARLES, was born at Besançon in Franche-Comté, on the 7th of April, 1772: he died at Paris on the 10th of October, 1837, in his sixty-sixth year. He lived and died a bachelor.

He was the son of Charles Fourier, a merchant and magistrate (juge consulaire) of the city of Besançon, who died when Fourier was in his ninth year, leaving a widow with a family of four children, and a property of about eight thousand pounds. Fourier was the youngest child and the only son. The property was divided into five parts; two-fifths being apportioned to him, and one-fifth to each of his sisters. Fourier's sisters married well, and have left large families.

After completing his studies at Besançon and Dijon, Fourier was placed in a commercial house at Rouen, where he remained a short time, and then removed to Lyon, in the year 1790, when the French Revolution was commencing. It was a most eventful period. New philosophies and theories were almost annually tried experimentally, and found deficient, notwithstanding their plausibility. Fourier, though young, was led to think of principles and causes; social evils and their remedies; the horrors of convulsive anarchy, and all the aberrations of philosophy which then distracted his unhappy country. He reflected long and deeply on these subjects, in the midst of his commercial occupations, and experience confirmed him in the opinion that something must be radically wrong, to cause so much injustice and antagonism in society. He studied much, and made himself acquainted with the principles and theories of all the leading parties. From them he turned to real science in its various branches; travelled much to gain experience, and laboured constantly with various feelings of alternate fear and hope, to discover the cause of social misery, and an efficient remedy. For years he laboured unsuccessfully, though not without increasing his experience and knowledge of the world. His studies were to some extent retarded also by the necessity of devoting a portion of his time to business. By the decree of the National Convention, August 23, 1793, Fourier was compelled to enter the army, and was drafted into the 8th regiment of 'Chasseurs à Cheval,' which joined the army of the Rhine and Moselle, where Fourier remained about two years; not without profiting by all that could be learned of scientific evolutions, as his writings indicate, when treating of g
exercises and the disciplines of education. He also p
attention to the theory of music during his conne
the army: but his health began to sink, and he ob
release in January, 1795. In 1799 he was emp
a commercial house at Marseille, and he had to d
operation of submerging a considerable quantity of
night in order to avoid the vengeance of the people,
suffering from scarcity of bread in the surrounding
The wheat which was thus thrown into the sea at
had been spoiled by being kept too long, in order to
the scarcity and raise the price. The scarcity of
been so general in the country, that the poor inha
many parts were suffering from famine and disease
occurred, and Fourier was more impressed than ever
awful state of social and commercial and political
which deranged the general economy of civilised soc
mind had been already fixed upon the problem for
years, but the first discovery of general importanc
doubted certainty was made soon after this remark
in 1799.

In 1800 he passed some months in Paris, and the
to Lyon, where he published articles in the newspap
were noticed by the government for their remarka
ness and extensive range of thought. One of tho
published in the 'Bulletin de Lyon,' in 1803,
'Continental Triumvirate,' attracted the attention
leon, who caused inquiries to be made about the
nothing further occurred. Fourier had to work
tails of his plans, and years elapsed before they
ciently mature for publication. Meanwhile he was
as a commercial agent, and only known to the
which he moved as a man remarkable for his
geography and general statistics. In conversation
intimate acquaintance he had mentioned many th
nected with his new discovery, and they at lengt
him to commence publishing before he had comple
secondary combinations of detail. To satisfy their
he issued a Prospectus, in which his general
broadly stated, but without an attempt at dem
This Prospectus was a small octavo volume, publishe
at Leipzig, according to the title-page, but there is
believe that it was printed and published at Lyo
feigned place of publication and without a print
in order to avoid the censorship of Napoleon.

This Prospectus was intended to announce the
of his new discovery in a series of eight octavo volu
published by subscription, and commenced as soon
cient number of subscribers had sent in their nam
work was entitled 'Théorie des Quatre Mouveme
Destinées Générales.' It is the strangest and mos
of all his works, though merely given as a general
ment of his theory. Surprise and wonder were
effects which it produced on those who read it and
public writers who reviewed it. It was too strange
tical to excite the interest of general readers, and
noticed by a few persons in the neighbourhood of
sunk into oblivion, without a dozen copies being sold

After publishing this voluminous 'Prospectus' of
of the cardinal movements, Fourier remained four
without publishing the continuation of his theory.
it appeared in 1808, he became aware of several
tions and omissions in the leading theorems, and ord
be withdrawn from circulation. A dozen copies
sold, at most, perhaps, besides what he had given to
vate friends or sent to be reviewed by public journal
thing therefore happened to bring Fourier or his th
public notice. He continued quietly his studies in
tude of private life, interrupted only by his
pursuits. He passed a portion of the following yea
in Switzerland; his general residence however was
for some years afterwards.

In the month of May, 1812, Fourier's mother
Besançon, where she had always lived. Being ex
religious, and desirous that her son should be so too,
been much alarmed at his new theories, for fear th
be leading him away from his religious orthodoxy.
however satisfied with his intentions and his explana
she died in peace.

Fourier's portion of the property which she left
come of 900 francs a-year, and that was nearly all he
upon besides his earnings as an agent for commerc
He still continued therefore in his mercantile positio

is known of his habits or his movements from 1808 to except a few incidents mentioned by himself, which as to suppose that he was much absorbed in study. In f his unpublished MSS. he says, in reference to the long al which elapsed between his first and second publica- 'It was well that I deferred the publication of my y, for it was not until 1814 that I discovered the prin- laws of equilibrium in combined associative harmony, ther branches of transcendental theory. It was not he year 1819 that I discovered the possibility of organ- associative unity without disturbing the present laws of ge.

y commercial duties had always prevented me from g that undivided attention to my discovery which its e details required. The stagnation however in which antile affairs were plunged by the political events of and 1815 induced me to retire from business and devote me exclusively to study. In 1816 I commenced the ration of materials for publication, but the problems to olved were so diversified and numerous—the subject so ense—that I could not succeed in bringing them within imits of an ordinary book. Twelve months were lost in g to condense the matter and improve the plan of distri- on. At length I fixed upon a plan of partial publication, h contained about one-quarter of the whole theory, but cient for all purposes of practical association on a simple e.'

uring the Hundred Days of Napoleon's reign Fourier placed at the head of the statistical department of the ecture or provincial government of Lyon, by his name- the Count Fourier, but after the second restoration of the rbon family everything was changed again, and Fourier ed from Lyon to Tallissieu in the autumn of that year, to the winter in his sister's family. From Tallissieu he t to Belley to reside with his other sister, and there he ained from 1815 until 1821, occupied exclusively in pre- ng the MS. of his future publication.

itherto no one had seriously thought of Fourier's idear is studies, but in 1814 a copy of his first volume fell entally into the hands of M. Just Muiron, of Besançon, tleman of studious habits and high standing in the pro- al administration of Franche-Comté, and also proprietor leading provincial newspaper, 'L'Impartial de Besançon.' e views of Fourier's theory announced in that volume a deep impression on Muiron, who wrote immediately e author to obtain more information on the subject. This a long correspondence and an interview, which tended nfirm Muiron in the high opinion he had first conceived th the author and his theory. After a due consideration e principles and an intimate acquaintance with Fourier, whom he gathered ample information on all points of rine, Muiron became the intimate friend and the first ed disciple of Fourier. He became more anxious than rier himself to have the theory completely published, and rtook to furnish a part of the funds for the expense of ting, as soon as the manuscripts could be made ready for press. Fourier sold a part of his little property to defray rest of the expense of printing. The correspondence een Muiron and Fourier became frequent. It is an in- ting history of Fourier's opinions and pursuits during the d of his studious retirement from 1816 to 1821. The e of Fourier's theory was written during this period, gh not more than one-fourth of it has ever been pub- d: the rest remains in MSS. unpublished at the present The MSS. were bequeathed by Fourier to his first ple Muiron, and are now deposited in the private library of halansterian School of Science, at Paris. The writer was itted to peruse them during the summer months of 1843. e interesting documents treat however chiefly on cos- ny, psychology, analogy, and other very abstruse sub- which are not attractive to the general reader.

one of his letters to Muiron he says, 'I have posi- y failed, after fourteen years' repeated application, to solve roblem of Passional Diffraction.' This, in the language ourier, is the principle of prophetic inspiration. It is an ract question, but we may give it one short paragraph of anation.

we compare the light of Revelation from the spiritual of the universe on the eye of the mind, with the light of natural sun on the eye of the body, we shall have the ct analogy beweeen the two, in harmony with the lan- ge of Fourier. There are three modes of action in the nsmission of natural light: *Refraction*, *Reflection*, and *Diffraction*. In the sphere of Revelation, or the transmission of spiritual light to the mind of man, Nature is the great fact of undoubted divine origin, which *reflects* to the eye of the inquiring mind the laws of God, which it reveals in its stupendous harmony. The mind of man itself, which is of divine origin also, is the power which *refracts* or divides the rays of mental light into their magic beauty of variety and colour. *Diffraction* is a mixed mode of action between refraction and reflection; and prophetic inspiration is a mixed mode of mental revelation, *written* in words similar to human verbalism, and *reflecting* divine wisdom just like Nature, but participating in the characteristic peculiarities of both; inasmuch, as it is partly reflective without explanation, like Nature; and partly refractive and explanatory, like the word of man. It is that mental or 'passional diffraction,' which Fourier could not find until he came to look for it in sacred prophecy, which he did before he published his 'New Industrial World' in 1829. In the following letter to Muiron, we shall find his reason for not coming to it earlier. Up to that period it is evident that he had consulted only two sources of divine authority and revelation, the human affections and universal nature.—

'Belley, February 20th, 1818.

. . . . 'What is the use of looking backwards always, and reasoning about the origin of evil and of suffering, when it is manifest beyond a doubt that both exist and press with all their weight upon humanity? It is better to look forward to find the remedy, and reason on the necessity of its existence from the nature of the following attributes of God:—

1, 'Universality of Providence.
2, 'Unity of System.
3, 'Economy of Principles.

'If God's providence be universal, of which we cannot doubt, He must have provided a law of social harmony and justice, and it is our duty to seek that law.

'If there be unity in the system of nature, the principle of *attraction*, which rules the material world, must also be the principle of harmony in the passional or social world.

'If economy in principles of action be the law of divine harmony in every other sphere, it must be so also in human society; and all experience, as well as science, proves that association is the source of all economy in social industry.'

In April 1821, Fourier, having prepared his MS. for the press, went to reside at Besançon to superintend the printing of his work, which was distributed in nine volumes under the following heads:—

1, 'The abstract principles of Passional Attraction, and their partial application to Industrial Association.' 2, 'Familiar Synthesis of the Principles of Attraction, and their equilibrium in practice.' 3, 'The Analysis of Man's physical, moral, and mental Nature, individually and collectively, with regard to Individual Variety and Universal Unity.' 4, 'Methodical Synthesis, and Transcendental Theory.' 5, Commercial Duplicity, and Ruinous Competition.' 6, 'The False Development of Human Nature, and a regular Analysis and Synthesis of False Development in Universal Nature as an exception to Universal Harmony.' 7, 'Universal Analogy and Illustrations of Cosmogony.' 8, 'The Scientific Theory of the Immortality of the Soul.' 9, 'Dictionary of Contents, References, &c. &c. of the whole Work.'

Each of these volumes contains between five and six hundred closely printed large octavo pages; but the first and second only, with a few extracts from the others, were printed and published in 1822, under the title of a 'Treatise on Domestic and Agricultural Association.' The other seven volumes still remain in manuscript, and unpublished for two reasons: first, because the friends of Fourier could not afford to be at the expense of printing them in 1822; and secondly, because Fourier and his friends have deemed it unnecessary to incur the expense of publishing the transcendental speculative part of the theory before the practical part, already published, has become more generally known and admitted.

The title of the whole work, we are informed by Fourier, in his preface to these two volumes, should be 'Theory of Universal Unity;' but as these two volumes relate chiefly to the practical science of domestic and agricultural association, he has given them that title only. The second edition, however, of his works, published in 1841 by the Phalansterian School at Paris, is entitled 'Theory of Universal Un y.' The first edition consisted of one thousand copies, and has been sold off between the years 1822 and 1842.

In this work Fourier professes to teach the science of associative unity, by which the produce of social industry may be increased from three to seven fold, and the economy of general and individual expenditure improved ten-fold; so that the practical advantages of association to all classes of society would be as thirty to one, and more in many instances, compared with the present state of things. Many of his statements are exceedingly simple and convincing; but to master his whole theory of universal science would require more time and mental application than the study of all the branches of mathematics. This is probably the reason why his writings are so little known and understood by general readers.

In November, 1822, Fourier's two large volumes were completed, and he went to Paris to have them advertised, reviewed, and sold if possible. Here he was disappointed. Few of the reviewers noticed his work, because he had no influence with the literary cliques of that city, and those who mentioned it said little more than that it was a voluminous and abstruse production.

After waiting twelve months to have his book reviewed, without obtaining any notice from the press beyond the mere mention of 'voluminous abstruseness,' Fourier published a summary of some one hundred and fifty pages, in the hope of obtaining a more favourable and detailed review. Here again he was disappointed. He was a stranger in Paris, and without friends of influence. He sent his work to many of the leading statesmen of the time, such as Benjamin Constant and others, but those who were polite enough to acknowledge the present, alleged their multifarious occupations as a reason for not having time to read the book.

Unable to continue the expensive residence of Paris, and perceiving that without more influence he could not succeed with the reviewers to obtain a proper notice of his works, Fourier returned to Lyon in the month of March, 1825, where his necessities compelled him to accept the office of cashier in a commercial house, at a salary of twelve hundred francs a year. In the meantime his book had been read by some inquiring minds in various parts of the country, and a few influential persons became professed disciples. In the summer of 1825, M. Grea, a gentleman of large property, invited Fourier to his country residence at the château of Rotalier, near Lons-le-Saulnier, where he was anxious that Fourier should remain and write a more elementary work for general readers. Fourier complied with the request, and commenced his compendium, but did not then complete it. He returned to Lyon for a short time, and in January, 1826, to Paris, where he remained nearly two years. In July, 1828 he went again to Besançon to print the compendium to his theory, which was published early in 1839, under the title, of 'The New Industrial World;' a large octavo volume of 600 pages, and the most methodical and elementary of all his works. In this volume he has devoted a long and elaborate chapter to the 'Confirmation of associative principles from the Gospel.' From 1822 he appears to have studied the Sacred Scriptures with devout attention, and to have altered his mind with regard to the influence of their authority in corroboration of his science.

During the time of his last visit to Besançon, his native city, to superintend the printing of his 'New Industrial World,' he resided in the house of a lady, Madame Clarissa Vigoureux, who had recently become a convert to his views, and who has since then devoted her whole fortune to the propagation of his theory.

In March, 1829, Fourier returned to Paris, where he continued to reside permanently. His compendium was treated by the press with the same indifference and silence as the larger work of 1822, and his name remained unknown to the public until the year of the Revolution, 1830, when the St. Simonians in Paris began to attract general attention by their eloquence and eccentricity. As this new sect professed to take an interest in social industry and combinative unity, Fourier sent a copy of his works to each of their leaders, offering to assist them in organizing practical associations, if they were willing to avail themselves of his theory. He had made the same offer to the English Socialists some years before; but his offer of assistance was treated with polite indifference by both the English and the French sects of social innovators. They believed their own theories superior to his, and declined the aid of his proffered instruction. This treatment soured Fourier's mind against both parties, and he resolved to publish a critical refutation of their respective systems, which he had hitherto regarded with complacency as indications of a desire to better the condition of the people, rather than with critical severity in analyzing their [illegible] omissions and defective principles. In 1831 he published pamphlet of seventy-two pages, entitled 'The Fallacy and Charlatanry of the St. Simonians and the Owenites.' The pamphlet contains a very severe criticism of the two systems, and was probably a powerful agent in neutralising the influence of the St. Simonians in France. Its tone is exceedingly bitter, but the arguments are irresistible. Whether his own theory be correct or not, he shows very plainly that both Owen and St. Simon are very far from possessing any thing like a practical and scientific knowledge of associative principles. Most of Fourier's writings display an irritable temper, but this pamphlet is lamentably deficient in equanimity, however just the arguments may be. It produced however, a very great sensation amongst the St. Simonians, and several of their conscientious leaders openly embraced Fourier's views, and left the St. Simonian sect.

This was the beginning of Fourier's notoriety and influence in Paris. Men of talent and of property began to group themselves around him in numbers, and in 1832 they were able to afford him the means of publishing a weekly journal, the first number of which appeared on the 1st of June, under the name of 'The Phalanstery,' a journal of industrial reform. Fourier edited this journal with the aid of several of his new adepts, who had left the St. Simonians. Many of his articles are deeply interesting, inasmuch as they are less abstruse and scientific than his books.

Being surrounded by new disciples, who were not thoroughly acquainted with his theory, and who were therefore partly imbued with preconceived ideas on many subjects, Fourier signed all his own articles, and declined all responsibility for those which bore the signature of his [illegible] editors. The journal was very ably conducted and extensively circulated, but it was too exclusively serious and scientific to meet with a sufficient sale to clear expenses. It was continued however two years, and laid the foundation of the Phalansterian Propaganda which has since spread over all parts of the globe.

The gentlemen who enabled Fourier to commence this journal, enabled him also to form a Joint-Stock Society for the practical experiment of his theory. Fourier was elected president, and his first disciple, M. Just Muiron, and M. Paul Vigoureux, vice-president and treasurer; M. Baudet Dulary and M. Grea, members of the Chamber of Deputies, were elected governors of the society and comptrollers of accounts. Shares were taken to the amount of twenty thousand pounds, and an estate of twelve or thirteen hundred acres of waste land was purchased at Condé-sur-Vegres, near Rambouillet. Buildings were commenced and other operations, almost immediately, against Fourier's will, before a sufficient number of shares had been sold to warrant such precipitancy; but his friends were so anxious to proceed rapidly, and so sanguine in their hopes of selling shares as fast as they could spend the capital in practical operations, that he could not prevail upon them to act strictly in accordance with the means in hand. The result was, that they were stopped short for want of sufficient capital. But M. Dulary, who was the principal shareholder, paid up all the other shares, and took the estate into his own hands until the means for continuing the experiment could be found.

In the spring of 1834 the weekly journal was also discontinued, and Fourier's theory was without an organ of publicity. The number of converts had however been increasing gradually, and Fourier's books were beginning to sell rapidly. His first volume was out of print in 1834, and the others were selling steadily. The public journals and reviews began to notice him and his system, superficially and sneeringly, but sufficiently to advance the sale of his works.

In 1835 he published another 8vo. volume, entitled 'False Industry;' but it was chiefly filled with criticisms of the present state of things, and contained nothing new in regard to his theory. In 1836 a monthly journal was commenced by his friends, under the name of 'La Phalange;' and this journal has been steadily increasing in influence ever since. In it was published twice a month: in 1840, three times a and it is now a daily paper, under the name of 'La cratie Pacifique."

The writer of this article first became acquainted Fourier personally in Paris, a few years before his He was a man of dignified simplicity, friendly and indulgent and sincere, but somewhat misanthropic in the latter part of his life, partly from disappointment in failing to realize his theory during his own lifetime. In person he ght, and of a nervous, irritable temperament: his sta- bout five feet seven inches. His physiognomy was sive, his hair light brown, complexion fair; his eyes ad of a mild expression. His nose was aquiline and rge, his lips thin and much compressed. His head was 'Gaulois' form, less oval than the Celtic, prominent in depressed behind, and very full on each side, and yet small than large. In early youth his favourite study ography; his favourite amusements were music and the tion of flowers. In one of his unpublished MSS. we ed an incidental comment on an author who asserts that an without a family may be happy with a small income. r's note is '*non ego*. My delight would be to travel, blish maps of a superior kind. This I cannot do with nall income.' He acquired a perfect knowledge of both as an art and a science; and in fact has made some vements in it which may ultimately be of considerable ance.

1837 Fourier's health began to decline rapidly, and on th of October he died, leaving a second volume of his Industry,' partly printed, but not published. The of his published works consist of—'Théorie des es Mouvements et des Destinées générales,' 1 vol. 8vo., ages, published in 1808; 'Traité de l'Association Do- que Agricole,' 2 vols. 8vo., published in 1822, and a sum- of the same, published in 1823, making altogether a of 1448 closely printed pages: 'Le Nouveau Monde, triel et Sociétaire,' 1 vol. 8vo., published in 1829, with et d'annonce of the same, published in 1830, 664 pages: es et Charlatanisme des deux Sectes St. Simon et ,' an 8vo. pamphlet of 72 pages, published in 1831: Fausse Industrie, morcelée, repugnante, mensongère; Antidote, l'Industrie naturelle, combinée, attrayante, ique, donnant quadruple Produit,' 1 vol. 8vo., pub- d in two parts, the first in 1835, the second in 1837, 840 .

sides these books he published a long series of interesting les in his weekly journal, the 'Phalanstere.'

second edition of his two first works has been published aris by the Phalansterian School of Science. The first on of the others is not quite sold off, or was not some few ths ago, though few copies then remained on hand.

urier's theory is based on One universal principle—that raction and repulsion, in all spheres of life and move- . The cardinal division of this One principle or law of ment, pivots on, or terminates in, what he terms Pas- l or Social harmony. When stated mathematically his e resolves itself into three theorems—three aspects of rsality—which are these:

Les attractions sont proportionnelles aux destinées.

a Série distribue les harmonies.

nalogie universelle.

se are fundamental axioms of science, and susceptible monstration. These axioms of science are accepted by halansterian school, and all that Fourier has been able to strate with them is admitted, but when he only cen- s from them, with regard to future periods, which he a very great extent, his school of science rests on his , leaving him to roam alone in the romantic regions of ation. They do not teach his speculative doctrines, onfine themselves to practical economy. All their writ- re directed to that object chiefly, and exceptionally o mere speculative controversy.

ere can be no doubt that one principle of unity governs e infinite varieties of nature, and that these varieties therefore, correspond to one another in some degree of or of remote analogy, as well as to the One great prin- in which they all unite; and hence the evident neces- f Universal analogy as a connecting link in nature, and der for the human mind to climb upon in rising to the tely great, or in descending to the infinitely small in ion.

hat order is heaven's first law, the law of universal har- y in fact, there cannot be a doubt in healthy minds; and variety is harmonised in unitary order, by the law of s or gradation, is self-evident, and hence the truth of ier's second theorem. The application of this law, how- is infallible in superhuman wisdom only, not in fallible nity; and hence it is that Fourier's school accept the f order or series, as he explains it scientifically, but re- their free assent in cases where a special application of aw is not sufficiently supported by experience or scienti- monstration. They never doubt the *truth* of this great law, but sometimes the *correctness* of Fourier's startling and prospective applications to the moral order of society.

That the general impulsions of created beings are adapted to the ends for which they are created, is a theorem which cannot be denied without imputing imperfection to the author of our being, and hence the first theorem of Fourier, that attractions are proportional to final destinies.

From this he argues that the affections and desires of human nature for individual and social happiness, are permanent impulsions destined to seek, and ultimately to find, the laws of their harmonious satisfaction. He also argues that these innate aspirations are eternal, and that they cannot be eradicated from the soul, but that they may be, and too often are, corrupted by temptation, instead of being developed in harmonious discipline. Whence he concludes that the disciplines of life for every age and occupation, or the institutions of society in moral and religious and industrial education, government and progress, are alone within the power of man to alter and improve, as a medium of due development for those impulsions which God has implanted in human nature, and over which man has no control but that of discipline, which may be good or bad, general or partial, and which may influence the destiny of human souls for good or evil, though it cannot alter human nature.

Fourier's whole life was devoted to this problem of social disciplines in every sphere of life, but particularly in the sphere of social industry. Whether his solution of the problem be complete or not, it cannot be denied that he has thrown considerable light on many questions of the highest moment to the present and the future welfare of mankind.

The general tone of his mind may be gathered from his answer to an allegation of scepticism from the 'Gazette of France,' two years before his death. He states that 'there are two doctrines which he could not deny without denying his own: the doctrine of Christ in religion; that of Newton in science.' Religious and political discussions are carefully avoided in all Fourier's writings. He professes not to meddle either with the throne or the altar. He establishes a 'School of Science,' but denies that he has any wish to form a new religion. He proclaims himself a Christian. Theology as well as politics he deems a proper subject for discussion, but not Revelation. He differs from philosophers and divines on many points of natural and Scriptural interpretation, but he never doubts of Revelation in the Word and in the works of God. If we have understood him rightly in his views of future unity in Christian faith, he believes the Roman Catholic religion will be universally adopted, when its œcumenical councils have been re-established, and the principles of love and charity regain as much ascendency as will admit of private liberty and toleration of opinion in the Church. The unity of Roman Catholic devotion will then harmonise the liberty of Protestant opinion, as the solar light includes the various coloured rays without destroying them in one refulgently impartial colour, White. Doctrinal variety and pure devotional unity appear to be the Phalansterian view of Christian harmony.

Since Fourier's death, the progress of his theory has been rapid, in almost all parts of the civilized world, but more especially in France and North America.

In 1840, Mr. Arthur Young purchased the estate of Citeaux, near Dijon, in France, for the purpose of commencing a joint-stock society, to carry out Fourier's theory of domestic and agricultural association. The estate contains more than thirteen hundred acres of excellent land, and a splendid château in the centre. Sixty thousand pounds have been invested in this estate, and it is now in active preparation for associative unity. There are one hundred and thirty persons residing in the château, and two hundred farming labourers are employed in busy seasons. The Phalansterians in France are numerous and active. In 1843 an appeal was made to the party for funds to establish a daily journal, and nearly thirteen thousand pounds were subscribed immediately for that purpose. The editor of the Phalansterian Journal in Paris is M. V Considérant, whose life has been devoted to the cause.

In North America the progress of this party has been very rapid since 1840, owing chiefly to the efforts of Mr. Albert Brisbane, an American gentleman, who became acquainted with Fourier and his theory in 1832. Besides the aid of several daily and weekly journals in New York, and other cities, the Phalansterians have commenced a dozen or more practical experiments in the United States.

In England the Phalansterian School has also its representatives. In 1840, Mr. Hugh Doherty commenced a periodical in London, called the 'Morning Star,' and in 1841 this journal became a weekly stamped newspaper, under the name of the 'London Phalanx.' It was not however able to sustain itself more than twelve or fifteen months as a weekly paper, and in June, 1842, it was continued in the form of a small monthly magazine, published in Catherine Street, Strand, which completed one yearly volume.

The Phalansterians have made little progress in England, owing perhaps to the abstruseness of their writings. They have not appealed to the popular feelings and interests in this country, as in America, probably from a fear of being misunderstood and misrepresented as political agitators and sceptical Socialists.

In Germany, and Italy, and Spain, books, and journals, and reviews, have been published by converts to the Phalansterian theory. In South America they have also published books and journals, and commenced two practical experiments in the Brazils. In Belgium and in Holland they are also gaining ground.

They call themselves a 'School of Science,' and object to being termed a religious or a political sect, on the ground that they meddle not with the interests of the throne or of the altar, though they claim the right of private judgment in matters of civil and religious liberty. They discuss freely also the doctrines of theology and politics, but not with a view to the subversion of established authorities in Church and State. Their object in discussing principles is to enlighten the authorities, but not subvert them. They conform to the established laws and government wherever they are, and profess to innovate in social industry alone, which interferes with no established institutions of society. They do not argue that the innovations which they contemplate in the sphere of social industry, would not ultimately modify the higher institutions of the State, but they maintain that such reforms would not be sudden or injurious to any class of vested interests, inasmuch as they would come into existence gradually.

As a school of science, the Phalansterians accept without reserve that part only of Fourier's theory which is susceptible of scientific demonstration; reserving all his speculative and conjectural assertions for the judgment of posterity; particularly with regard to marriage. They accept the principle of his discovery, the 'law of series,' as the law of universal harmony, but not the infallibility of his novel applications of that law in the sphere of moral and domestic life.

They have published many elementary works on social science and general principles. The following is a list of their most important books, but their minor tracts and pamphlets are too numerous to be named here.

French works published in Paris:—'Essai sur les Procédés Industriels,' 1 vol. 12mo., 230 pages, by Muiron; 'Transactions sociales, religieuses, et scientifiques,' 1 vol. 8vo., 200 pages, by Muiron; 'Etudes sur la Science Sociale,' 1 vol. 8vo., 480 pages. J. le Chevalier; 'Destinée Sociale,' 2 vols. 900 pages, V. Considerant; 'Politique Générale,' 1 vol. 8vo., 160 pages, *id.*; 'Manifeste de l'Ecole Societaire,' 1 vol. 8vo., 160 pages, *id.*; 'Débacle de la Politique en France,' 1 vol. 12mo., 150 pages, *id.*; 'Science Sociale,' 1 vol. 8vo., 240 pages, by Doctor Paget; 'Calculs Agronomiques et Considérations Sociales,' 1 vol. 8vo., 180 pages, Lemoyne; 'Solidarité,' 1 vol. 8vo., 300 pages, Reynaud, captain of artillery; 'Ménage Sociétaire,' 1 vol. 8vo., 200 pages, M. Harel; 'Fourier et son Système,' 1 vol. 12mo., 300 pages, Madame Gatti de Gamond; 'Le Fou du Palais Royal,' 1 vol. 8vo., 500 pages, F. Cantagrel; 'Théorie de l'Association,' 1 vol. 8vo., 400 pages, Ed. De Pomperey; 'Charles Fourier, sa Vie, et sa Théorie,' 1 vol. 12mo., 560 pages, C. Pellarin.

English Works published in America:—'Social Destiny,' 1 vol. 8vo., 500 pages, Albert Brisbane; 'Doctrine of Association,' 1 vol. 8vo., 100 pages, double columns, small type, *id.*

English Works published in London:—'Fourier and his System,' translated from the French of Madame Gatti de Gamond, 1 vol. 8vo., 100 pages, T. Wood; 'A Journey to the Phalanx, and Hints for Railway Travellers,' 3 vols. 12mo., 700 pages, C. H. Crewe; 'Biography of Fourier, with a critical Introduction to Fourier's Social Science,' 1 vol. 8vo., 170 pages, Hugh Doherty; 'The London Phalanx,' weekly series, one large volume in folio, *id.*; 'The Monthly Phalanx,' 1 vol. 8vo., 416 pages, *id.*

Phalansterian Tracts:—'High Rents and Low Wages;' 'Social Maladies and Social Doctors;' 'Hints on Poor Law Legislation;' 'Position of Woman in Harmony.'

FRACTIONS, DECOMPOSITION OF, a method of much use in the integral calculus for reducing p the form $X(x-a)^{-m}(x-b)^{-n}\dots\dots$ in which X and integral to the sum of terms of the form K(x– which K is independent of x. But if X be of dimension than $m+n+\dots$ there is also a quotient.

This quotient may be easily found by the shor division by $x-a$. To divide $px^m+qx^{m-1}+\dots$ take the first coefficient, multiply it by a and add repeat this process to the end, taking care to use coefficient of any missing term. The results, begin the first coefficient, are the coefficients of the except the last, which is the remainder. Thus i $2x^7-2x^6+x^3+x-1$ by $x-3$, the coefficients are

$$2\quad -2\quad 0\quad 0\quad 1\quad 0\quad 1\quad -1$$

The results of the rule are

$$2\quad 4\quad 12\quad 36\quad 109\quad 327\quad 982\quad 2945$$

Hence the quotient is $2x^6+4x^5+12x^4+36x^3+109x$ 982, and the remainder is 2945. To divide by $x-(-a)$, use $-a$ as a multiplier.

Thus to find the quotient of x^8-2x^3+4 divided $(x+1)^2(x-5)$, the process is as follows, it being s hand that the answer is of the second degree. W the work which is of no use in the final result.

$$\begin{array}{ccc}
1 & 0 & 0\\
1 & 1 & 1\\
1 & 2 & 3\\
1 & 3 & 6\\
1 & 2 & 4\\
1 & 1 & 3\\
1 & 6 & 33
\end{array}$$

When we divide x^8-2x^3+4 by $x-1$ the three of the quotient are $x^7+x^6+x^5$: two divisions mor give $x^5+3x^4+6x^3$. We then divide twice foll $x+1$, still preserving only three terms, and th x^3+x^2+3x, and the final division by $x-5$ $x^2+6x+33$ for the three first terms of the final quo is, for the whole quotient. For verification the or divisions may be varied.

When all the roots of the denominator are unequ when the quantity to be reduced is of the form X $(x-b)^{-1}(x-c)^{-1}\dots.$ where a, b, c, &c. are al the process for finding the reduced form of the re very easy. Strike out $(x-a)^{-1}$ and make $x=a$ in thus mutilated; let this result be A. Next $(x-b)^{-1}$, and make $x=b$; let the result be B; Then the fraction $X(x-a)^{-1}(x-b)^{-1}\dots.$ is th if any, $+A(x-a)^{-1}+B(x-b)^{-1}+\dots.$ Thus the expression $x^6\div(x-1)(x-2)(x+1)$, we set the work, as follows; the quotient being of the thir

$$\begin{array}{cccc}
1 & 0 & 0 & 0\\
1 & 1 & 1 & 1\\
1 & 3 & 7 & 15\\
1 & 2 & 5 & 10
\end{array}
\qquad
\begin{array}{r}
1^6\div(-1\times2)=-\frac{1}{2}\\
2^6\div(1\times3)=\frac{64}{3}\\
(-1)^6\div(-2\times-3)=\frac{1}{6}
\end{array}$$

And the final result is

$$\frac{x^6}{(x-1)(x-2)(x+1)}=x^3+2x^2+5x+10$$
$$-\frac{1}{2}\,\frac{1}{x-1}+\frac{64}{3}\,\frac{1}{x-2}+\frac{1}{6}\,\frac{1}{x+1}$$

When the roots of the denominator are not all e way of proceeding which is most easy in the sim which generally occur in practice, will be best ca an example. Suppose for instance, that $(x^4+1)\div$ $(x-2)(x+1)$ is the fraction to be reduced. Begin denominator $(x-1)(x-2)(x+1)$, and, by the p rule, obtain the result,

$$\frac{x^4+1}{(x-1)(x-2)(x+1)}=x+2-\frac{1}{x-1}+\frac{17}{3}\,\frac{1}{x-2}+\frac{1}{3}$$

Divide both sides by $(x-1)$, and turn $(x+2)\div$ into $1+3\div(x-1)$, and also by the rule, convert

$$(x-1)^{-1}(x-2)^{-1}\text{ into }-(x-1)^{-1}+(x-2)$$

$$(x-1)^{-1}(x+1)^{-1}\text{ into }+\tfrac{1}{2}(x-1)^{-1}-\tfrac{1}{2}(x+1$$

the result is

$$\frac{x^4+1}{(x-1)^2(x-2)(x+1)}=1-\frac{15}{6}\,\frac{1}{x-1}-\frac{1}{(x-1)^2}$$

$$+\frac{17}{3}\,\frac{1}{x-2}-\frac{1}{6}\,\frac{1}{x+1}$$

More complicated examples may be seen in the 'Differen- Calculus' (*Library of Useful Knowledge*, p. 273. The re will be sufficient for ordinary purposes.

RAMBÆSIA. [SKIN, DISEASES OF, P. C. S.]

RANCESCA, PIERO DELLA, called also Piero ghese, from his native place, Borgo San Sepolcro, where vas born about 1408. His chief service was in perspec- which he was the first to fully develop in practice; in r respects his works, of which few remain, are in the pre- ng antique style of the period, such as we find it in the s of Perugino and other contemporaries. Piero's greatest is the legendary history of the Cross, in San Fran- at Arezzo, from the very seed placed in the mouth of n at his burial, from which the tree grew of which Cross was made: it is still preserved, though much in- by time and ill-usage. He died about 1496.

ero's theoretical knowledge of perspective appears to have considerable, and he was, according to Vasari, one of est geometricians of his time: he wrote several treatises ese subjects, some of which are still preserved at Borgo Sepolcro. Some of his writings, says Vasari, were dis- stly published by his pupil Fra Luca dal Borgo, or Luca iolo, as his own; but the truth ofthis statement is doubted. a's works are, 'Summa Arithmeticæ;' 'La divina Pro- ione,' with figures by Lionardo da Vinci; and 'Inter- zione di Euclide.' He did not write on perspective; where he notices the subject, he alludes to Piero della ncesca as 'el monarca de la pictura.' A Life of Piero was ished at Florence in 1835, by Gherardi Dragomanni.

Vasari, *Vite de' Pittori*, &c., and the Notes to Schorn's man translation of Vasari; see also Rumohr, *Italienische schungen*.)

RANCIA, FRANCESCO, the name by which Fran- o Raibolini is known, and which he wrote upon his works, r the name of his master the goldsmith. Francia is one he most celebrated of the Italian painters, and the most ect in his style, the *antico-moderno*, or that transition e between the comparatively meagre works of the most inguished early masters and the fully developed form and acter of the works of Raphael and his great contem- aries. The exact period of his life is not known, but he born at Bologna about 1450, or the middle of the fifteenth tury, and he died there after 1522, surviving Raphael eral years: a St. Sebastian, one of his best pieces, is ed 1522; there is a copy of it in the Misericordia. The y told by Vasari, therefore, about his dying of vexation n seeing the St. Cecilia of Raphael, which was consigned him in Bologna, in 1518, supposing the signature of the Sebastian to be authentic, is incorrect, as is also Calvi's ount, that he died in 1517, though the latter is adopted by ordani and Waagen in their catalogues of the galleries of logna and Berlin: he died, according to Lanzi, in 1533. ncia was by education a goldsmith and a die and niello raver, and he is supposed to have taken up painting at a paratively late period: he must however have had some tation as a painter in 1490, as he was then employed on nsive works in the Palazzo Bentivoglio at Bologna. He an admirable colourist, and the greatest master of Bologna re the Carracci. He signed himself *Aurifex* on his paint- , and *Pictor* on his jewelry. The two pictures by him in National Gallery are admirable specimens of his style, more perfect individual specimens than any other of the ign pictures in the collection: they were formerly in the e of Lucca's collection, and were purchased for the na- in 1841 for 3500*l*.

Giacomo Francia, the son and pupil of Francesco, painted is father's style, and, though far from equalling his father, a good painter: he died in 1557. A Life of Francia was lished at Bologna in 1812, by J. A. Calvi.

Vasari, *Vite de' Pittori*, &c.; Malvasia, *Felsina Pittrice*; zi, *Storia Pittorica*, &c.)

RANCIA, DOCTOR JOSE′ GASPAR RODRI- EZ (and he himself at least appears to have written the e with the feudal prefix, De Francia), the late famous tator of Paraguay [P. C. xvii. 226], is said to have been n near the town of Assuncion, the capital of that country, in 1757 or 1758. His father, who was a chacarero, or small proprietor cultivating his own land, is admitted on all hands to have been a European; but it is doubtful whether he was French or Portuguese. Francia himself, who had a passion for everything French, alleged that his father came from France; if it was so, the name he bore may have been given him to mark his original country. Most probably however the name may have suggested this pretension to the dictator. However that may be, old Francia had come over to Brazil, and, proceeding thence to the Spanish possessions in the interior, had finally settled in Paraguay, where he married a Creole, and had this José and other sons and daughters. José was his eldest.

When he came to the proper age, young Francia was sent to the University of Cordova, in the neighbouring province of Tucuman, to be educated for the church; and he passed through the usual course of theological instruction, or the greater part of it. According to one account, indeed, he took his doctor's degree in that faculty. It is most probable however that his doctorate was not of divinity but of law, which he ultimately determined to make his profession. The change was perhaps prompted in part by the turn which his opinions had taken or begun to take towards deism, the avowed creed of his latter years, which he had imbibed from reading the works of Rousseau, Raynal, and other French writers of that school. He seems to have spoken as well as read the French language; and he also brought away with him from college, besides what he learned of law, and what he may have preserved of his theological acquirements, some knowledge of mathematics and of mechanical philosophy, a taste for which departments of study he preserved to the end of his life.

Establishing himself in the town of Assuncion, Francia spent there perhaps the next thirty years of his life as an advocate or barrister. He had a good practice, and a high reputation both for legal learning and for integrity and independence of character. 'He never,' we are told, 'would defend an unjust cause; while he was ever ready to take the part of the poor and the weak against the rich and the strong.' This is the testimony of Messrs. J. P. and W. P. Robertson, in other respects far from favourable witnesses.

The revolution which brought about the independence of the Spanish possessions in South America began in Buenos Ayres in 1810, when Francia was fifty-two or fifty-three years old. Paraguay refused to join the other La Plata provinces in this movement, and was successful in repelling a force sent from Buenos Ayres under General Belgrano to compel its adherence; but the next year, nevertheless, it set about and accomplished a revolution of its own. Francia had probably been active in directing this course which things had taken; and when the independent junta was set up, with Don Fulgencio Yegros, the general who had defeated Belgrano, as president, Francia was appointed secretary. Yegros and the others however could not get on with him—or he with them—and he soon resigned his post, retiring to a country house in the neighbourhood of Assuncion. One account says that he was brought back again and withdrew more than once; and it would also appear, that after serving as secretary he was for a time a member of the junta; but he seems at any rate to have finally retired sometime in 1812. Everything now went from bad to worse; and the Paraguayan public mind seems to have taken up a fixed idea that only Francia could set matters right. Accordingly, a new congress which assembled in 1813 placed him and Yegros at the head of the republic under the name of joint consuls. It is admitted that from this moment the state of public affairs began to improve in all respects; in particular the protection of the country from foreign invasion, a calamity which had actually begun to come upon it before from some quarters, and been threatened from others, was effectually secured. It was with a view to this particular object that Francia first introduced his non-intercourse system. The conflagration of civil war and confusion was already spreading fast through the rest of the South American continent: this was Francia's plan, in which he was perfectly successful, of preserving Paraguay from being enveloped in the same calamity. The peculiar character which had been impressed upon society in that country by the Jesuits at the same time favoured and may have partly suggested the policy which he thus adopted; and the course of events, after it was tried and found to answer, led by degrees to its more strict enforcement. It became at last so complete that, as is well known, all ingress into Paraguay or escape from it became nearly impossible, nor had the country any political relations, or almost any commercial communication, with any other part of the globe.

Before matters came to this, however, Francia's joint consulship had been converted, first in 1814, by a third congress, into a dictatorship for three years, and then in 1817, into a dictatorship for life. Yegros, who had been all along a mere cypher or useless incumbrance, was of course got rid of. He afterwards, in 1819, involved himself in destruction by engaging in a conspiracy for the assassination of his former colleague: the detection and defeat of which at the same time consolidated and greatly strengthened Francia's power. It appears to have been principally during the existence of the critical state of affairs produced by this plot, a period of two or three years, that the system of somewhat sanguinary severity which has been called the reign of terror, was kept up by Francia. In that time he is said to have put to death about forty persons.

Francia remained supreme and absolute master of Paraguay till his death on the 20th of September, 1840, when he was succeeded by a Directory, or governing junta, of three persons.

The instances of what is called Francia's tyranny as exercised on foreigners that have had the greatest noise made about them are those of his treatment of M. Bonpland, MM. Rengger and Longchamp, and the Messrs. Robertson. Bonpland, the distinguished botanist, had set up an establishment for the culture of Paraguay tea in the adjoining district of Entre Rios, a sort of debateable land, and was there seized, in 1821, by order of Francia, and carried off into Paraguay, which he was not allowed to leave so long as the dictator lived. He seems to have been considered by Francia to have trespassed upon the rights of the republic by his tea-growing speculation. However, beyond his forcible detention he was never harshly treated, and he continued in the country of his own accord for some time after Francia's death, if he be not there still. Messrs. Rengger and Longchamp were two Swiss surgeons who had found their way into Paraguay in 1819, and were detained by the dictator, principally, it would appear, for the sake of their professional services, till 1825. After their return to Europe they published an account of their adventures and of the country, under the title of 'Essai Historique sur la Révolution de Paraguay, et le Gouvernement Dictatoriel du Docteur Francia,' which contains on the whole the best materials that have yet been given to the world for the history of Francia and his administration. As for the Messrs. Robertson, they were not detained in the country, but turned out of it. They have told their own story, though rather confusedly, in their 'Letters on Paraguay,' 2 vols. 8vo. Lon. 1838, and 'Francia's Reign of Terror,' 8vo. Lon. 1839. The most distinct and graphic sketch that has been drawn, at least in English, of Francia and his career, is in a very characteristic paper by Mr. Carlyle, in the 62nd No. of the 'Foreign Quarterly Review' (for July, 1843), pp. 544-589. If it should be thought too much to soften some of the more startling points in the dictator's character and conduct, and to give him the benefit of a favourable doubt somewhat too liberally, it may be corrected by comparison with the Messrs. Robertson's unmixed and unmeasured condemnation. Mr. Carlyle has derived some of his facts from a funeral discourse delivered at the celebration of the obsequies of Francia by the Rev. Manuel Antonio Perez, in which his government is lauded in the highest terms. He certainly appears to have been to the last looked up to both with respect and gratitude by the Paraguayans. Perez says that when he was dying the people crowded round the government house in tears.

FRANCKLIN, THOMAS, D.D., was born at London in 1721. Being the son of the well-known printer, Richard Francklin, who, for his paper 'The Craftsman,' and other services to Walpole's enemies, expected or had been promised a provision in the church for his son, he was educated at Westminster School, and thence sent to Cambridge, where he became a fellow of Trinity College. Afterwards, while an usher in Westminster School, he gained some reputation by translations of Phalaris's 'Epistles,' and of Cicero 'De Natura Deorum;' and in 1750, after a contest, he was chosen Greek professor in the University of Cambridge, an appointment to which he appears to have done as little credit by the regularity of his deportment as by his literary exertions. After having held lectureships in London, he was presented by his college, in 1758, to the livings of Ware and Thundrich in Hertfordshire. Although, however, several sermons of his were published during his life, and three volumes of them after his death, he was always chiefly employed in
in literary labours and literary quarrels. Among hi
that with Arthur Murphy was the most noted. H
London on the 15th of March, 1784. His writ
numerous and varied, but of little value. Among hi
works were a poem called 'Translation,' 1753;
cal called 'The Centinel,' intended as a continuatio
World,' but dropped at the twenty-seventh numbe
butions to Smollett's 'Critical Review;' and one or
ferent plays. His translations were voluminous,
were of tragedies from the French of Voltaire and
in the presenting of which to the stage the sources
from were not always acknowledged. But the
tions of Francklin that are now remembered by a
his Sophocles and Lucian: the Sophocles first pu
1759, 2 vols. 4to., and the Lucian in 1780, 2 vols.
latter is much the better of the two.

FRANCO, BATTISTA, called Semolei, a p
engraver, born at Udine, according to Vasari, abou
died at Venice in 1561.

Though of the Venetian State, Franco was of th
tine school. He was a great imitator of Micha
with whose style of design he combined some of
lences of Venetian colour. He painted much at Fl
at Rome; but few easel pictures, and his works a
ingly rarely seen in galleries. His engravings o
are numerous, but nearly all after his own designs
mannered, but executed with great power. Franc
master of Baroccio.

(Vasari, *Vite de' Pittori*, &c.; Bartsch, *Peintre-*

FRANCUCCI. [IMOLA, INNOCENZIO DA, P. C

FRANK PLEDGE. [LEET, P. C.]

FRANKALMOIGNE. This tenure is thus
by Littleton (§ 133): 'Tenant in Frankalmoign
an abbot or prior, or other man of religion, or of ho
holdeth of his lord in Frankalmoigne; that is
Latine, *in liberam eleemosinam*, that is, in free al
such tenure beganne first in old time. When a
time was seised of certain lands or tenements in hi
as of fee, and of the same land infeoffed, an abb
covent, or prior and his covent, to have and to ho
and their successors in pure and perpetual almes, o
almoigne; or by such words, to hold of the grantor
lessor and his heires in free almes: in such case the
were holden in frankalmoigne.' From this it a
lands which are held by religious bodies or by
religion, are held by tenure; but neither fealty nor
temporal service is due. The spiritual services
due before the Reformation are thus described by
(§ 135): 'And they which hold in frankalmoigne
of right before God to make orisons, prayers, m
other divine services for the souls of their grantor
and for the souls of their heires which are dead,
prosperity and good life and health of their heires
alive. And therefore they shall do no fealty to t
because that this divine service is better for them b
than any doing of fealty; and also because the
(frankalmoigne) exclude the lord to have any earthl
poral service, but to have only divine and spiritual
be done for him.'

On this section (§ 135) Coke has the following
which explains how most lands are now held by the
the church of England, and by spiritual corpor
England:—'Since Littleton wrote, the liturgie or
Common Praier of celebrating divine service is alter
alteration notwithstanding, yet the tenure in frank
remaineth; and such prayers and divine service sha
and celebrated as now is authorized; yea, though t
be in particular, as Littleton hereafter (§ 137) saith
sing a mass, &c., or to sing a *placebo et dirige*, y
tenant saith the prayers now authorized, it sufficeth.
Littleton hath said before (§ 119), in the case of So
changing of one kind of temporall services into ot
poral services altereth neither the name nor the effe
tenure; so the changing of spiritual services in
spiritual services altereth neither the name nor the
the tenure. And albeit the tenure in frankalmoign
reduced to a certaintie contained in the book of
Prayer, yet seeing the original tenure was in franka
and the change is by generall consent by authority
ment (2 Ed. VI. c. 1; 5 & 6 Ed. VI. c. 1; 1 El
whereunto every man is party, the tenure remains
before.'

12 Charles II., which abolished military
sly excepts tenures in frankalmoigne.
iold lands in frankalmoigne must do the ser-
ı these lands were given. These services are
ed, as Coke says, by the book of Common
mode of compelling these tenants to do their
escribed by Littleton (§ 136) :—'And if they
ir tenements in frankalmoigne will not, or fail
ne service (as is said), the lord may not distrain
doing this, &c., because it is not put to cer-
rvices they ought to do. But the lord may
s to their ordinary or visitour, praying him that
ne punishment and correction for this, and also
ch negligence be no more done, &c. And the
itour of right ought to do this,' &c.
itute of 18 Ed. I., called *Quia Emptores*, from
ry words, there can be no gift in frankal-
t by the crown. This tenure, however, as
serves, 'is the tenure by which almost all the
teries and religious houses held their lands;
he parochial clergy and very many ecclesiastical
ary foundations hold them at this day, the nature
being upon the Reformation altered, and made
the purer doctrines of the Church of England.'
NIA, a genus of plants, the type of the natural
aceæ, and named in honour of John Frankenius,
botany at Upsal, and the first enumerator of
plants in 'Speculum Botanicon.' It has a 5-
lobes oblong, with the stigmas within. Cap-
with three or four valves, and many-seeded.
re small and heath-like, with prostrate stems;
ually rise from the forks of the stem or are
minal corymbs.
nta, or the Powdery Sea-heath, has its leaves
horls, obovate, retuse, glabrous, and the under
ry, with ciliated petioles; a slender root, and
nal flowers of a pale-red colour. This plant
and by the sea-shore in many parts of Europe
s occasionally found on the coast of Sussex in
s very rare.
ıs clustered, linear, glabrous leaves, with re-
s, ciliated at the base; prostrate downy stem,
axillary solitary flowers. It is a native of the
rshes by the sea-coast, in many parts of Europe
y Isles. In England it is found principally on
ast, and flowers in the months of July and
flowers are generally flesh-coloured, but some-
ith yellow claws.
ates sixteen species of this genus, besides those
as being found in Great Britain. Of those
lants the majority occur in Africa and New
some are found in South America. *F. hispida*
rocks extending from the island of Cyprus to
hardy species of this beautiful evergreen genus
d to ornament rockwork, and may be easily cul-
y may be propagated by cuttings or by dividing
may also be grown from seed under a hand-glass.
dener's Dictionary; Babington, *Manual of*
y.)

SIMON. [LOVAT, LORD, P. C. S.]

STATUTE OF. [STATUTE OF FRAUDS,

LENT CONVEYANCE. [CONSIDERATION,

REUTH (*Berchtesgaden*) is a village of Bavaria,
of Berchtesgaden, in the circle of the Isar.
-works here, where the rock-salt from the Salz-
d down. There are quarries of marble in the
l.
ndbuch, by Hörschelmann.)

OFER, JOSEPH, a distinguished optician
s born at Straubing in that kingdom, in 1787,
umble life; and, by their death, he was left an
eleven years of age.
n accustomed to labour from his childhood, and
ngaged as an apprentice to a manufacturer, who
him an unremitting attention to the mechanical
nnected with his calling: yet, though few and
ere the intervals of relaxation which his daily
fforded, the youth found means, without the aid
r, to supply in a certain degree the deficiencies
on, and to make some progress in the study of

An accident, which nearly cost him his life, was the cause that the merit of Fraunhofer became known: an old house in which he lodged fell down one day and buried him in the ruins; he was extricated however, and, almost by a miracle, came out unhurt. The interest excited by the danger which the young man had escaped drew upon him the notice of several persons of rank and fortune; and these, being struck with admiration on discovering the efforts he had made in the midst of many adverse circumstances to cultivate the sciences, procured for him an introduction to the celebrated Reichenbach, who received him, he being then about twenty years of age, into the great manufactory for the construction of mathematical and philosophical instruments which that artist had established at Benedictbaiern, near Munich. In this situation Fraunhofer had ample scope for the exercise of his talents; and he distinguished himself as much by his inventive genius as by his skill in executing the mechanical processes on which he was employed. Enabled now to study optics as a science, he used the means at his disposal to make many important experiments on light, and to construct instruments of superior kinds for celestial observations. By his discoveries and improvements he greatly increased the reputation of the establishment to which he belonged; and at length it became his own property.

Fraunhofer was a member of the University of Erlangen and of the Royal Academy of Sciences at Munich; and in 1822 this academy appointed him keeper of the Museum of Physics. The King of Bavaria conferred on him the order of Civil Merit, and the King of Denmark that of Danebrog. He died in 1826, in the thirty-ninth year of his age.

His most remarkable discovery was that of the existence of a series of dark lines in the spectrum produced by the refraction of the sun's light in a prism of glass or other transparent medium. The prisms were formed of a material free from veins, and, in the experiments, they were disposed so that the light entered and emerged at equal angles with their sides, by which means each of the coloured spaces in the solar spectrum on the screen were homogeneous: on examining these with a telescope, it was perceived that they contained many black lines parallel to one another and to the breadth of the spectrum; and Fraunhofer ascertained that they amounted in number to about 354; Sir David Brewster has since discovered many more. By means of a theodolite he measured the angular distances between the most strongly marked of these lines in every two of the differently coloured spaces in the spectrum produced by each of the prisms employed in the experiments; and thus he was enabled to determine with great accuracy the indices of refraction for the mean rays of the prismatic colours in each of the media of which the prisms were formed, as well as the dispersive powers of those media. He observed similar black lines in the spectra of the Moon, Mars, Venus, and some of the fixed stars; also in the spectra formed by the two polarized pencils produced by a prism of Iceland spar. An account of the observations on spectra was published in a pamphlet entitled 'Bestimmung des Brechungs- und Farbenzer-Streuungs-Vermögens verschiedener Glasarten in Bezug auf die Vervollkommnung achromatischer Fernröhre,' 4to., Munich, 1815.

Fraunhofer also made experiments on the phenomena arising from the interference of light in passing through small apertures of different forms, and through wire gratings. In these experiments the direction of a pencil of solar light was fixed by means of a heliostat, and was examined through the telescope of a great theodolite: the apertures, which were circular, triangular, and rectangular, were formed in a metal plate which was placed before the telescope; and the gratings at first consisted of very fine wires arranged parallel to one another in a frame, but Fraunhofer afterwards used glass plates covered with gold leaf or with a thin film of grease on which were ruled parallel lines at distances from one another equal to $\frac{1}{8200}$ inch. The light was allowed to traverse the grating or plate of glass after having passed through a very narrow aperture: the image of the aperture appeared well defined as if the grating had not been there; on each side of it was a broad band quite black, and beyond these were spaces brilliantly coloured with homogeneous light, in which were seen dark lines as in the solar spectrum: to the coloured bands succeeded, on each side, a dark space, and beyond this were other bands of colour. Remarkable spectra were also produced by two wire frames placed one behind the other, the wires crossing one another at right angles: the aperture through which the light proceeded was circular, and the coloured spaces, which were seen on a dark ground, are described as being very brilliant. An account of the experiments on the inflexion of light were published in 4to. at Munich, under the title of 'Neue Modifikation des Lichtes durch gegenseitige Einwirkung und Beugung der Strahlen und Gesetze derselben.'

Fraunhofer executed an equatorially mounted telescope for the observatory at Dorpat. The diameter of the object-glass is nearly 10 inches and its focal length about 16 feet; it consists, as usual, of a convex lens of crown glass, and a concave lens of flint glass, but the materials were compounded by himself, and the performance of the instrument is said to be superior to that of any which had been made before. A description of the telescope is given in the 'Astronomische Nachrichten,' Nos. 74, 75, 76, with a memoir on the refractive and dispersive powers of different kinds of glass. In the same work is a memoir by Fraunhofer on halos, parhelia, and the like phenomena: in this he ascribes the formation of the small solar and lunar halos to the inflexion of light in the vapour of the atmosphere; and that of the larger kind, to the refraction in hexagonal prisms of ice.

(*Biographie Universelle*, and the works quoted.)

FRAXINELLA, the common name of a plant belonging to the genus *Dictamnus*, which is referred to the order Rutaceæ. Dictamnus has a 5-parted, unequal, deciduous calyx; 5 unequal unguiculate petals; 10 declinate stamens with awl-shaped, filiform, unequal filaments, having glandular tubercles at their apex, and roundish anthers; the style single, declinate, striated lengthwise, terminated by a blunt papillose stigma; the capsule stipitate, composed of 5 carpels, which are connected on the inside, compressed, 2-seeded.

D. Fraxinella, Bastard or False Dittany, False White Dittany, Fraxinella, has 4-5 pairs of leaflets, cordate at the base, acute at the apex, finely serrulated, the racemes long, the calyx unequal. It is found wild in the south of Europe, especially in Germany, France, Spain, Austria, and Italy.

The leaves, flowers, and stem of this plant, when gently rubbed, emit a strong lemon odour, and when bruised the scent is more powerful. The volatile oil which gives it its peculiar odour is secreted in the largest quantities in the pedicles of the flowers, which are covered with little glands of a rusty red colour, which exude a viscid resinous juice. The volatile oil from this plant is evolved in so large quantities that it will burn when a light is held near it, and, in a dark place, may be seen to take fire. It was formerly used in medicine under the name of *Dictamnus albus*, and the root was considered stomachic, anthelmintic, and aperient. Stoerck, to whom we are indebted for the re-introduction of so many European plants into modern medicine, recommended it in epilepsy, intermittent fever, and amenorrhœa. The plant used in medicine under the name of *Dictamnus Creticus*, the Dittany of Crete, is the Origanum dictamnus of Linnæus. [ORIGANUM, P. C. S.]

D. angustifolia, has 4-5 pairs of leaflets, alternate, ovate-lanceolate, acuminated, finely serrulated, the racemes long, the calyx nearly equal. It is a native of the Altaian Mountains.

There are several varieties of Fraxinella found in gardens, with white, red, and purple flowers. They will grow in any common garden soil, and may be grown from seeds, which ripen well in this country.

(Don, *Gardener's Dictionary*; Burnett, *Outlines of Botany*; Lewis, *History of Materia Medica*.)

FRAXININ. [CHEMISTRY, P. C. S.]

FRAZE'RA, a genus of plants belonging to the natural order Gentianaceæ, named after John Frazer, a collector of North American plants. It has a 4-cleft deeply-parted calyx. The corolla 4-parted, rotate, deciduous, with a bearded orbicular gland in the middle of each segment. The stamens 4, enclosed; filaments filiform; the capsule compressed, partly margined, 1-celled. The seeds few, imbricated, elliptical, winged, and fixed to the margins of the valves.

F. carolinensis, the *F. Walteri* of Michaux, is the only species of this genus. It has a biennial root; stem from 3 to 5 feet high, erect, sub-quadrangular, and smooth; leaves opposite and verticillate, oblong, lanceolate, the lower ones a foot long and more than three inches broad; flowers in aggregate clusters. This plant is indigenous in the swamps of the Carolinas, and is found on the borders of lakes in Pennsylvania and New York. The whole plant has a very stately appearance, and in character approaches so near to Swertia that, without examining the fruit, it might be mistaken for a species of that genus. The root yields a powerful bitter, nearly as pure as that of quassia, and wholly destitute of aroma. It is fully equal
in its medicinal effects to gentian, and when fresh
be emetic and cathartic. The roots have been imp
Europe as a sort of Calumba, and hence have acq
name of American Calumba. This plant requires
and flourishes best in a peat soil. It should be pro
winter after being raised from seed, or that pre
flowering.

(Don, *Gardener's Dictionary*; Lindley, *Flora M*

FREDERIC WILLIAM III., King of Prussia
eldest son of King Frederic William II., by his sec
Friederike Louise, princess of Hesse-Darmstadt: he
on the 3rd of August, 1770. Frederic William, t
of this notice, was the grand-nephew of King Freder
the Great, under whose superintendance he was pr
the important functions which he was destined to dis
the throne of Prussia. Frederic II. was extremely f
young prince. As Prussia owed her grandeur to t
of a warrior, the sword was thought to be the main i
of her future prosperity; and the hero of the Se
War was much pleased whenever his youthful gran
announced by some sprightly remark or spirited a
courage and enterprise were prominent features of
On one occasion the young prince was playing wit
the royal gardens in the presence of old King Fred
ball having rolled to the feet of the king, he picked
refused to give it back. With his face flushed w
and his hands on his sides, the boy called out, '
majesty give me the ball or not?' The king lau
giving the ball up, 'Sure Fred.,' he cried, 'the
take Silesia from thee!' The prophecy proved
though the greater portion of his kingdom was wr
King Frederic William III., by Napoleon in 18
remained with her lawful sovereign. The chie
Prince Frederic William was Benish, one of
privy councillors; General von Backhoff instructed
military sciences: both are said to have been hone
unfit for training the mind of a youth; and wel
writers of that period assert that the education of
was bad. Frederic William was sixteen when, th
death of Frederic II. in 1786, he became Crown-
father Frederic William II. having succeeded Kin
During the reign of Frederic William II. Prussia
in general opinion. The successor of the great Fr
utterly unable to maintain the dignity of a kingdo
to so many chances as Prussia then was. Jealousy
interest induced him to declare the equilibrium of
dangered through the combined war of Austria
against Turkey; his unjustifiable interference in th
disturbances in Holland, his presumptuous war
French republic, and, above all, his conduct towar
in its two last partitions, placed him in the eyes
Europe among the worst of tyrants; and the syste
lerance and hypocrisy which he introduced th
medium of his minister Wöllner, into the adminis
his kingdom, exposed him to both hatred and ridic
haughtiness which he showed in his conduct to
French republic seemed to promise that he woul
faithful ally of the powers that were united against
it were only through fear of disgracing himself by n
with the 'republican mob.' Great was therefore
prise of Europe when he concluded with France th
peace of Basel in 1795. That peace, however, w
been a wise act, but for the neutral position in
placed Prussia at a time when all Europe was a
position which was more dangerous than a protracted
France. Death saved Frederic William from rea
harvest of shame and disgrace of which he had
seeds, and which became the portion of his son and su

Frederic William III. succeeded his father on th
November, 1797. He had already distinguished hi
Landau and Pirmasens, against the French, as comm
part of the Prussian avant-garde, and he had con
marriage of pure love and esteem, in 1794, with th
plished Louise Auguste Wilhelmine Amalie, Pri
Mecklenburg-Strelitz.

At that time the Prussian monarchy contained about
English square miles, with a population of above ten
—an area and a population three times greater th
which constituted the kingdom when the great Frede
to the throne. But one-third of this country was fo
the provinces acquired by Prussia in the partitions of
and the Polish capital, Warsaw, was then a provinc
of Prussia; from this portion of the monarchy t

ɪd more nominal than actual strength, and among its
tants there was not one in ten thousand whom he could
loyal subject. The treasures left by the great Frederic
een squandered away by Frederic William II. in his
igns in Holland, France, and Poland, and a consider-
lebt, contracted by the same king, now added to the
lties in which the state was placed through his un-
policy. Under these circumstances Frederic William
urned his attention to the re-organization of the finan-
partment, and the introduction of a better system of
istration. The direction of affairs was intrusted to
enlightened ministers; many functionaries, either sus-
or guilty of maladministration or embezzling the public
were dismissed; and the young king gave a still stronger
of his love of justice by sending into exile the Countess
htenau, the mistress of his father, who had exercised a
ernicious influence over him.

se changes were, however, far from being radical, nor
hey calculated to extricate Prussia from the dangers of
litical position. From the moment that King Frederic
m II. had signed the peace of Basel, Prussia was
in a net, and the favourable moment to disentangle
by again joining Austria in her struggle against France
een neglected. Frederic William III. directed all his
towards upholding his neutrality in the great European
le, and the French press was active in persuading him of
vantages of his policy. The first consequence of this
was distrust on the part of Austria, Russia, and Great
towards Prussia, and still more on the part of the
German princes, who hitherto had looked upon Prussia
ir protector against the ambition of the house of
a. But it soon became manifest that the king in-
, with the aid of France, to aggrandise his dominions
r expense. He made his first acquisition by the peace
eville, when he received the bishoprics of Hildesheim,
born, part of that of Münster, and some other territories,
n area of about 5130 English square miles and 600,000
tants, as an indemnity for some districts on the left bank
Rhine, which had been ceded to France by the peace of
el, and which had an area of only 900 English square
with 170,000 inhabitants. These territories were seized
efore the decree of the diet of Regensburg (Ratisbon) in
through which the partition of Germany was legally
, and which he thus anticipated, being sure of the sup-
f Russia and France. For as early as 1801 Frederic
m adhered to the plan of the Emperor Paul of Russia
st the English supremacy on the sea, and a Prussian
aving been carried by an English cruiser to the port of
ven, the king sent troops to that place and seized her,
gh Cuxhaven was within the territory of Hamburg.
d was then far from wishing to have Prussia as an
, and, anxious to prevent a rupture with her, George
ent his son Adolphus, now Duke of Cambridge, to
to settle the affair in an amicable manner. In spite of
riendly overtures Frederic William gave way to the
ous advice of some of his ministers, and secretly pre-
for taking military possession of the electorate of
er and the whole German coast between Denmark and
d. This gave rise to fresh distrust, and Prussia would,
s as early as 1801, have felt the consequences of her
, but for the assassination of the Emperor Paul of
, and the friendly dispositions of his son and successor
nder towards Great Britain; in consequence of which
nvention of the 17th of June, 1801, was signed, and
restored between Russia and England. Nelson's attack
penhagen, in April, 1801, had already forced Denmark
hdraw from the Northern Coalition, and thus Prussia
vas compelled to abandon her hostile designs towards
nd. Yet there was no real friendship between Prussia
ither England or Russia, and the conduct of Frederic
m towards Austria was so equivocal, that he was not
considered at Vienna as an intriguer, but as a secret
y who was to be compelled by the sword to adopt ano-
line of policy.

ring this time the friendship between Prussia and France
trengthened, and the intercourse between the two govern-
and between the king and the first consul Napoleon
parte. It was, however, evident than when Prussia
d anything from France, she seldom got it; but when
e was the claimant, Prussia always yielded. No sooner
onaparte declared that the residence of so many French
ants in the Prussian dominions seemed to be dangerous
n, than Frederic William ordered them to leave his
kingdom immediately, and this order was likewise extended to Louis XVIII., who was residing quietly at Warsaw, but was now compelled to take refuge in Russia. The legitimists in Europe now treated Frederic William as a traitor to the holy cause of kings. Their astonishment was still greater when, after Napoleon had crowned himself Emperor of France, in 1804, the King of Prussia was the first of the potentates of Europe to recognise him, and to accept and bear the Grand Cross of the recently founded order of the Legion of Honour, in acknowledgment of which the king sent Napoleon the Grand Cross of the order of the Black Eagle. It seemed to be settled that the King of Prussia was to receive all northern Germany as the price of his neutrality and friendship, as soon as it could be occupied with safety. Napoleon used to speak of King Frederic William in terms of the highest esteem, but events soon showed that he despised him.

In 1805 Napoleon's designs against England were frustrated through a new coalition headed by Great Britain, Austria, and Russia. From Boulogne, where the French army had been concentrated for the intended invasion of England, it advanced by rapid marches to the frontiers of Austria. Berlin was the centre of the most important negotiations; for the king's aid seemed to promise victory to the side to which he should incline; and a large party in Prussia, tired of the king's indecisive policy, declared that Prussia had been treated with contempt by Napoleon, and that it was now time to fight against the usurper. Frederic William, however, still professed friendship for Napoleon; he assembled a strong army on the frontiers of Austria, but whom that army was to oppose was known only to a few. The Emperor Alexander now demanded a free passage through Silesia for a Russian army, which was either to join the Austrians in Bohemia, or more probably to occupy Hanover, and having met with a refusal, he repeated his demand in an imperious tone. The King of Prussia answered that his generals had received orders to treat any Russian who should set his foot on the Prussian soil as an enemy. There was little doubt that in this struggle also Frederic William would remain either neuter, or wait till one of the belligerent parties should have been weakened by defeats, and then join the victor and have his share in the spoliation of Austria or France. No sooner had the war broken out than the violation of the Prussian dominions in Franconia, by Marshal Bernadotte, showed how little Napoleon cared for the Prussian king—or rather, how well he knew that Frederic William was a man of indecisive character, who would not avenge an insult unless he could do it with impunity and profit. However, that insolent violation roused the war-party in Prussia; and Frederic William, always influenced by circumstances, now followed the advice of his minister the Baron von Hardenberg, and consented to an interview with the Emperor Alexander, which led to the Convention of the 3rd of November, 1805; in consequence of which a Russian army was allowed to pass through Silesia.* Napoleon's wrath at this unexpected news was indescribable; but being then in the heart of Austria and on the eve of a battle, he concealed his vexation. Through his intrigues, however, he induced Frederic William to dismiss Von Hardenberg, and to appoint in his stead Count Haugwitz, a nobleman of immense wealth, great talents, and distinguished as an able statesman, but whose political principles were too much like those of his master to steer Prussia with safety through the sea of dangers on which she was then embarked. Haugwitz hastened to the head-quarters of Napoleon in Moravia. A battle between the hostile armies was unavoidable; and the general opinion in Prussia was that Haugwitz was to present his master's ultimatum to Napoleon, and either to compel him to make peace with Austria on the *status quo*, or to have a new enemy in Prussia. One hundred and fifty thousand Prussians were on the Moravian frontier, ready, as it seemed, to join the Austro-Russians, from whom they were separated only by a few days' march. No ultimatum was tendered to Napoleon. Haugwitz waited till the Austro-Russian army was annihilated by Napoleon in the battle of Austerlitz (2nd of December, 1805), and the day after the battle impudently congratulated Napoleon in the words 'Dieu merci, nous avons vaincu!' 'If I had lost,' said Napoleon to his ministers, after Haugwitz had left him, 'he would have said the same to the Emperors of Austria and Russia.'

Only thirteen days after the battle of Austerlitz (15th of

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* In a secret article of that Convention, Frederic William promised to join the coalition against Napoleon unless he withdrew from Germany before the 15th of December.

December, 1805), a treaty was concluded at Vienna, through Haugwitz, between France and Prussia, which astonished all Europe, caused deep indignation in England, and filled all Prussian patriots with shame and despair. Prussia ceded to France her dominions in Franconia, the violation of which had caused so much indignation in Germany, and received as the reward of her duplicity the electorate of Hanover, though only *de facto*, and till a general peace to which Great Britain should be a party should be made. Hanover had been occupied by the French in 1803, against the law of nations. In that year George III. renewed the war against France as King of Great Britain and Ireland, but not as Elector of Hanover; and in order to establish that distinction, he sent a circular to the courts of Europe informing them that Hanover was out of the question, and was consequently a neutral territory. In this case however, as in so many others, Napoleon disregarded international law; and the consequence was, that Hanover was first occupied by the French, and afterwards by the Prussians. According to the condition on which Prussia was put in possession of Hanover, she could only hold it as a trustee for the Elector King George III.; but a second convention, concluded at Paris on the 15th of February, 1806, showed that Frederic William intended to annex Hanover to his dominions, which he actually effected, declaring that he had received Hanover as a lawful conquest of Napoleon. Thus a king, whose love of justice was afterwards extolled in such extravagant terms, committed an act of robbery through which he violated the law of nations no less than the rules of political decency. His policy in those transactions was most severely but most justly commented on in both Houses of Parliament; and he who would write a history of Prussia without a careful examination of those debates would fall far short of doing what truth and justice demand.

Prussia soon received the due punishment for the duplicity of her government. The first consequence of the treaty of Paris was a declaration of war by Great Britain; in a few months several hundred Prussian ships were seized by the English cruisers; and England's ally King Gustavus Adolphus IV. of Sweden occupied the duchy of Lauenburg, an appendage to the electorate of Hanover, for George III., and threatened to invade Prussia. However, as neither Great Britain nor Sweden was able to injure Prussia much by land, King Frederic William hoped to settle his differences with those powers and to enjoy the profits of his neutrality, but he was roused from his dreams by the insolent conduct of Napoleon, and at last brought to see clearly his dangerous position. The history of those times shows plainly that in such a contest as was occasioned by the French revolution, there was no lasting neutrality possible for any power which was in direct contact with French influence, and that there was no chance left but to fight either for or against France. In the struggle against French aggression, Great Britain, never vanquished—and Austria, often vanquished but never discouraged—were foremost in showing that perseverance and consistency in political principles that should characterize great powers. There was less stability in the policy of Russia, since its government was less guided by principle than by selfish and ambitious plans; but Russia could waver, because political faults or want of character did not expose her unwieldy body to the danger of being overthrown by a single blow. But how could Prussia, the neighbour of France, stand untouched by that violent storm, when distant Portugal was summoned to surrender, and did surrender her position among the kingdoms of Europe at a day's notice? And even Turkey was so deeply engaged in the political intrigues of the time, that she too was on the eve of crumbling under the dissolving spirit of the Revolution, although the elements of her political existence had no affinity with those on which the imperial throne of France was based. The king and statesmen of Prussia had ill understood the French revolution, and they now suffered for it.

As to the personal character of Frederic William, he was considered to be a just man, of plain understanding, more admired by his subjects for the qualities of his heart than those of his head, and little disposed to admire others for their talents or genius. There is no doubt that Napoleon expressed his real opinion when he spoke of him with contempt, and his contempt changed into animosity in proportion as the Prussian cabinet deranged his plans without exactly thwarting them. On ceding Hanover to Prussia, Napoleon could boast of having caught Frederic William in a trap from which he could not escape without becoming either his vassal or his enemy; and *matters* being once in this condition, the French emperor
boldly proceeded towards pushing him to extremiti
foundation of the Rhenish confederation, which, as
openly said, would be as useful to him against P
against Austria, was only notified by Napoleon to the
cabinet after it was completely established, though
seem that such a union of most of the members of the
empire would not even have been proposed to any
without previously consulting Prussia, if Frederic Wi
been regarded by Napoleon with that respect and
which he owed to the head of one of the great
kingdoms. Another provocation was the occupatio
new Grand-Duke of Berg, Murat, who was the broth
of Napoleon, of the territories of the Prince of Na
Orange, the brother-in-law of the King of Pru
perhaps a direct order of Napoleon only could indu
to take possession of three abbotships in Westphal
had belonged to Prussia since 1803. In order
Frederic William's anger at the establishment of the
Confederation, Napoleon, with apparent friendship,
to him to form a similar union in northern Germ
with still more manifest disrespect towards him, he o
Hanse-Towns not to adhere to the contemplated conf
because he would take them under his immediate
and he secretly enjoined several princes in northern
to refuse any closer alliance with Prussia. At the
Von Hardenberg, the successor of Count Haugwit
minister of Prussia, was maliciously attacked in th
official newspapers; nor was there lack of articles
Frederic William was ridiculed, or the pride of
provoked. The majority of the Prussian nation,
their queen Louisa, called loudly for war; but the
now accustomed to neutrality, and time was r
prepare him for acting with decision. A fresh i
France at last roused his spirit; he learned, eithe
his ambassador in Paris, or indirectly through t
ministers, that in the secret negotiations which
carried on between Great Britain and France, Na
promised to restore King George III. to the po
Hanover. His language against France became n
and he listened to the proposal of the Emperor
who promised to assist him with a powerful army if
wage war with France, and in order to make a
pression upon the king and to show him that he was
he declined to ratify a treaty of peace with France,
of those long negotiations which were carried o
that country and Russia ever since the peace of
between France and Austria in 1805. Under su
stances hostilities between Prussia and Great Br
suspended, and Frederic William sent his ultimatum
leon, demanding that the French armies should im
evacuate Germany and retire beyond the Rhine
German prince not belonging to the Rhenish Con
should be prevented from adhering to the con
Northern Confederation; and that the Prussian
occupied by the Grand-Duke of Berg should be r
Prussia. This ultimatum was rejected by Napol
stood with his main army on the frontiers of Fran
Thuringia, and thus the war broke out on the 6th of
1806. The Prussian main army was in Thuringi
composed of troops who, down to the meanest
thought themselves equal to those warriors wi
Frederic II. had resisted Europe, and it was increas
numerous and well-disciplined contingents of the El
the Dukes of Saxony, the Elector of Hesse-Cassel,
of Brunswick, and several other princes, who had
an offensive and defensive alliance with the king of

As this article does not profess to give a sket
history of Prussia, but of that of her king, we shal
details of the war. But a short explanation of th
social, and political elements from which Prussia dr
strength or weakness will be the more necessary as t
the forces with which Frederic William thought him
to bring his material means into action against th
power.

Several millions of Prussian subjects were Pol
ready to fight against than for their king. In
torate of Hanover the Prussians were regarded as
and thousands of the male inhabitants, headed by gen
the first families of that country, had left, and
leaving their homes, to serve under the English
against the French in Sicily, Spain, and Portugal.
western part of the monarchy there were several ol
sions of the House of Brandenburg, the inhabitants

among the most warlike and most loyal of the Prussian ts; but in those which had been acquired since 1803, eople, mostly Roman Catholics, showed little sympathy eir king, while the wealthy nobles either served in the ian army or lived in proud retirement at their country- in Westphalia. Different from these were the inhabit- f the ancient dominions of the house of Brandenburg in -eastern Germany; and even in Silesia, though it had ged to Prussia only since 1742, and the greater number e inhabitants were Roman Catholics, King Frederic am could reckon upon as many loyal servants as he had ts there. In these parts the peasant now enjoyed per- ersonal freedom, but he was still bound to assist the s of noble estates in their agricultural labours and to hem tithes and similar contributions. But the vicious m of government education, and still more the social nce of the petty nobles, had a demoralizing effect upon class, as well as upon the inhabitants of the towns, and ally speaking the Prussian of that time was more like a han a free man. To bring men down to that condition however consistent with the plan of the government, se everything, down to the most trifling transaction of life, was under its immediate inspection; and blind obe- e was the principal virtue of a Prussian citizen. The ity were considered the main support of the king and the lom. But that nobility differed widely from what we stand by the name in England. Among the members e real German nobility, who previous to the dissolution e empire participated in the government of Germany, as es, counts, or knights of the empire, there were very who had become subjects of Prussia, and in the antient sions of the House of Brandenburg there were none at class. The cause of this was that Brandenburg all the other German provinces east of the Elbe originally inhabited by people of Slavonian origin, who subdued by a few great barons of northern Germany, ially the dukes of Saxony of the house of Anhalt; these barons alone formed the nobility in those pro- s, as the term was then understood, namely, peers of German Empire. Only two native Slavonian princes acknowledged as such by the emperors, the Duke omerania and the Duke of Mecklenburg, who, by itting to the supremacy of the emperors, became peers empire, and henceforth belonged to the German no-

A protracted resistance of the Slavonian population their conquerors occasioned long and bloody wars, in more than one-half of the oppressed race perished, others emigrated into Poland. In order to keep the ing Slavonians in obedience, and to repeople the coun- system of colonization was carried on in those provinces, ich the reader will find an excellent account in Von be, 'Die Deutschen Colonien in den Wendischen rn,' and the main features of which were these:—A the great native landowners were maintained in the sion of their estates, either as freeholders or as vassals conqueror; the bulk of the native population were bondsmen, and one part of their lands was given to the ts and other freemen who had assisted the German con- in subduing the country; and the other part was d among thousands of German colonists, mostly Saxons Westphalians, who were invited thither by the con- rs, and either lived as farmers or settled in the ruined s. Henry the Lion, Duke of Saxony, was particularly sful in making Slavonian conquests, and he also was the to introduce a regular system of colonization. The ex- of country thus colonized and gradually Germanized was at that its government was entrusted to special officers d Margraves, who held the rank of princes of the empire, among them the Margrave of Brandenburg was the most rful. In the kingdom of Prussia Proper colonization carried on through the Teutonic knights, and there, as as in the more western countries, the foreign element absorbed by the German. This sketch will show that present kingdom of Prussia is originally a German colony, although its assimilation to Germany was rendered com- through the policy of its princes and the spirit of its itants, traces of its origin were still visible in 1806. freemen who had received larger estates in those parts ed the same privileges which the large landowners pos- d in Germany Proper; they had a share in the adminis- n of their province; and they rendered knights' service eir prince, each bringing with him as many men as his would allow. The dignity of knight having become hereditary in their families, they claimed the title of nobles also, and as early as the sixteenth century the members of this class, or the landed gentry, were called nobles by courtesy, and they finally became noble by right, thus constituting the lower nobility, but being still considered of inferior blood to the high nobility. In the time of Frederic William III. this class had lost their political privileges; but they took precedence of other gentlemen, from whom they were distinguished by the prefix 'Von' before their family name, in as much as the places of officers in the army and in the higher branches of administration were nearly exclusively conferred upon them; nor could any man obtain a place of consideration in the household of the Prussian king unless he was by patent or immemorial prescription entitled to put the prefix 'Von' before his family name. In consequence of these practices the whole class of petty nobles became the born servants of the crown, and we cannot wonder that they were looked upon as its firmest support. They were nevertheless detested by all the other classes, and for good reasons. Sons of conquerors, yet without any political rights, they were proud of their social importance; but while they treated other people with insolence and contempt, they behaved with abject servility towards the government and the king. Most of them depended entirely upon the crown for their livelihood, for they were, generally speaking, not rich; swarms of younger sons had no property, and no other occupation was considered by them as befitting their rank except commissions in the army or the numerous places in the judicature. Such persons would seldom practise the law as advocates; not independence, dependence on government was their pride. There was more independence among the heads of the families, but it was as wavering as their fortunes: owners of a country that draws its riches principally from the trade in corn, of which it produces four times more than it consumes, they were proud or humble according to the price of corn in England, and a falling off in the London market was sufficient to bring some dozens of haughty landowners at the foot of the king who would otherwise have continued the independent occupations of their forefathers. The vanity and insolence of the officers of the army had reached its height. Every man arrogated a part of the glory of the great Frederic, and he who had served in the Seven Years' War was promoted to the highest military honours, however unfit he might be for the rank. Hence commands of the highest importance were given to officers broken by age, or enervated by an idle life in the garrisons during a long period of peace, and who afterwards so shamefully betrayed the confidence of their king by surrendering, without resistance, the strongest bulwarks of the kingdom. The French, with whom they had now to fight, were viewed as a band of adventurers and scoundrels, void of every principle, virtue, and honour. A colonel of the king's guard, when he set out with his regiment and was cautioned to be on the watch against such an enemy as the French grenadiers, cried out, 'A shame it is to make use of arms against such dogs as the French! Sticks and horsewhips are the weapons they ought to be beaten with.' This anecdote is from the work of Bishop Eylert, who is anything but a detractor of Prussian virtue. If King Frederic William had possessed a little sagacity, he would have discovered that his hopes rested on a rotten foundation, and that he was going to fight against the best general and the best troops of Europe, with an army whose natural courage and excellent discipline were led to the field by vanity and overbearing insolence.

The war broke out on the 1st of October, 1806: a fortnight afterwards the glory of the Prussian name was prostrated on the field of Jena. The king behaved most gallantly in this unfortunate battle; he had two horses killed under him, and his cloak was pierced by bullets. Another fortnight, and Napoleon entered Berlin. The Prussian army was annihilated: corps of 20,000 or 30,000 men, commanded by heroes of the Seven Years' War, laid down their arms to small detachments of the French. Spandau, Stettin, Cüstrin, Hameln, Glogau opened their gates, before their walls had been touched by a cannon-shot; Magdeburg surrendered without resistance, though occupied by a garrison of 20,000 veterans, who were to defend there the great magazines of the army. 'In the Seven Years' War,' wrote Frederic William to his queen, 'Prussia stood alone against Europe, and was often in a more dangerous position than now: we are not alone now, we have Russia.' This is another instance that the fact of Prussia having been victorious in the Seven Years' War was still considered as a proof that she would always remain so: but there is a difference between talking of great things and doing them. The assistance of Russia only delayed the ruin of Prussia. In the battle of Eylau (8th of February, 1807) both the French and the Russians claimed the victory; but on the 14th of June, the anniversary of the battle of Marengo, the fate of Prussia was decided in the field of Friedland. A few days afterwards Napoleon entered Königsberg, his troops pushed still farther on towards the Russian frontier, and before the month of July the whole of the Prussian kingdom was in the hands of the French with the exception of a few fortified places, and Memel, an open town in the extreme eastern corner of Prussia Proper. Both Alexander and Frederic William now sued for peace: separate conventions of peace had already been made between Napoleon and the German allies of Prussia, namely, Saxony and some smaller states. The town of Tilsit was chosen as the place for the ensuing negotiations. The three sovereigns were to meet on a raft constructed on the river Niemen, which formed the boundary between Prussia and Russia. The first interview took place between Napoleon and Alexander alone, on the 25th of June, 1807. On the following day Alexander presented Frederic William to his victor. Napoleon was haughty, sometimes bitter; Frederic William, worn out by care, showed himself cold and reserved, speaking little, yet betraying his personal hostile feelings towards Napoleon. Some days afterwards Queen Louisa arrived, and it was expected that she would succeed through her amiable character and ability in bringing Napoleon down from his conditions; for it was already known that he did not intend to give back many of his conquests. But so far was she from making the slightest alteration in Napoleon's intentions, that he treated her several times rather rudely, giving her to understand that he guessed very well the motive of her presence at Tilsit. When, in the course of the negotiations it became clear that Frederic William had to cede all his dominions west of the Elbe, the queen in vain tried to persuade Napoleon to give Magdeburg back, and it is said that she threw herself at his feet, imploring him with tears to restore that great fortress to its former master. But this also was of no avail.

Peace was concluded at Tilsit on the 7th of July, 1807. The first article of this peace, referring to Prussia, is a proof that Napoleon not only despised Frederic William as a man, but wished to make him feel it, for the article begins with these words: 'Moved by esteem for the Emperor of Russia, and in order to give a proof of his earnest desire to unite the Russian and French nations through the bonds of friendship and unalterable confidence, the Emperor Napoleon consents to give back to the King of Prussia part of his conquered kingdom.' Upon this follows the description of those territories which Napoleon gave back, but not of those which the vanquished party ceded, as is generally the case in transactions of the kind, and this circumstance is another instance of Napoleon's desire to humble his unfortunate enemy. By this peace Frederic William lost the greater part of his realm; all the territories west of the Elbe, and nearly the whole of his Polish dominions, altogether about 70,000 English square miles, with a population of 6,000,000. The Polish dominions were given to the Elector of Saxony, who had assumed the title of King of Saxony, as the grand-duchy of Warsaw, except the district of Bialistok, which Russia received; and thus the Emperor Alexander was rewarded at the expense of his unfortunate ally. Out of the German dominions was created the new kingdom of Westphalia, and some parts were given to Saxony and the grand-duke of Berg. The king was further required not to prevent any German prince from adhering to the Rhenish Confederation; to promise to become a member of this confederation at some future time; to reduce his army to 40,000 men, and to pay 146,000,000 of francs (nearly 6,000,000*l.* sterling) to France. Till this money was paid French troops were to occupy Berlin and the principal fortresses of Prussia.

Thus, one terrible blow prostrated Prussia, and reduced one of the great monarchies of Europe to the rank of a third-rate power. The remaining part of Prussia was completely exhausted. Upwards of 7,000,000*l.* sterling had been paid to France, during the war, under the title of contribution or fine, according to the circumstances; as much in money or in value had been taken by the French soldiery, and wherever the French had been quartered—and they had been quartered in all parts of the kingdom—the houses were burnt, the fields destroyed, the cattle killed, and the horses taken away. Under these calamities the king remained calm, and never for one minute betrayed any symptoms of despair. The reorganisation of his kingdom occupied all his thoughts.
Such a sudden downfall of his power and glory at l
him that he had laboured under a most fatal mistak
glory was that of his ancestors, and his power a
Still at the mercy of Napoleon, he nevertheless con
plan of removing the causes of so much evil, and
ducing radical reforms into all the branches of admi
and he carried his plan out with a patience, a resi
perseverance for which he deserved more praise th
served blame for his insolent conduct in the ti
prosperity. No sooner was the peace concluded th
ceeded to St. Petersburg; he afterwards lived at M
Königsberg till the French troops evacuated Berlin,
returned to his capital in December, 1809, after a
of three years. Most of his ministers, and many h
tionaries, were dismissed, and the Baron Von Stein
prime minister. Those among the generals who ha
like cowards in the field, or shamefully surren
strongest fortresses, were tried and punished; other
behaved well were promoted, and among these
generals Scharnhorst and Gneisenau, the regenerat
Prussian army, and the brave Blücher, who alone
Prussian name from eternal disgrace, till he also
pelled to surrender to the superior forces of Berna
the battle of Lübeck in November, 1806. Stein h
pleased Napoleon, the king was obliged to dismi
appointed Von Hardenberg in his stead, who howev
the same spirit as his predecessor. The principa
effected during this period were as follows:—The
nants of the bondage of the peasantry were aboli
difference existing between gentlemen who had
'Von' before their family name, and those who h
with regard to their capacity to hold commissions in
in the judicature, or in any other branch of admi
was abolished, and the king solemnly declared that h
merit, talent, and learning alone should guide his cho
vants; trade, and the exercise of all mechanical arts,
free, and the existing corporations with their exclu
leges were abolished; the municipal corporations in
received (in 1808) privileges of self-government o
democratical character. All these, and many oth
tended to create a nation of independent men, and sh
Frederic William had been mistaken when he
the descendants of the first conquerors as the chief
the state; all difference between these, the desc
the first German settlers, and even those of the sub
was now abolished for ever. The military system
cally reformed: every subject able to carry arms wa
under obligation to fight in case of necessity, and
the army three years; so that although the arm
parently only 40,000 men strong, it was really much
There is no doubt that Frederic William had a
share in these reforms, and though he did not de
he deserves credit for following the advice of those
the actual originators. The greatest difficulties in t
ation of the kingdom arose from the state of its
a system of economy was therefore introduced of whi
offers few parallels. Frederic William set a nobl
by selling his plate and jewelry, for which he rece
ral millions of thalers from Hamburg merchants,
many of the crown lands of which he was the owner
sent his brother William to Paris for the purpose of
better conditions for the payment of the sums due t
On the 8th of September, 1808, this prince made
ment with Napoleon's minister de Champigny, acc
which Frederic William was relieved from his obl
enter the Rhenish Confederation, and the French tro
to evacuate Prussia, on condition of seventy-three m
francs being paid within twenty days, and twelve b
for seventy-two millions, each of six millions of fra
able at one month, two months, and so on. Prus
still unable to raise so much money in so short a
other convention was made by which the debt was di
by twenty millions of francs, on condition that the re
be paid in thirty-six monthly instalments. Even thi
tion Prussia would not have fulfilled, if the king ha
clared that he could pay one half of it, feeling hims
to do so as possessor of the (remaining) crown land
were then, and still are, more extensive than one i
induced to suppose from the little splendour that is e
by the Prussian court. Struggling with all these di
the king approved of the plan of establishing a univ
Berlin; and he showed much zeal in its foundatio
took place in 1810. He also invited distinguished n

of Germany to assist him in his difficult task of
g Prussia: the historian Niebuhr, who deserves so
e for his laudable conduct in this period, had
Prussian service as early as 1806. Upon this dis-
rtic zeal and activity Napoleon looked with sus-
empt till he became acquainted with the existence
gendbund" or "the League of Virtue," which in-
to watch the movements in Prussia more closely,
s to form the plan of ruining her entirely at the
unity. That league was a secret association of
n and women, the object of which was to promote
and political virtue, to raise the broken spirit of
and by thus strengthening its moral force, to
strive for independence at the first dawn of pos-
he queen Louisa was one of the principal leaders of
ion, and some say that she first conceived the plan.
rer was the power of Napoleon that no one could
n Prussia would find an opportunity of breaking

the five years that followed the peace of Tilsit.
illiam was the humble vassal of Napoleon, who
y opportunity of humbling and weakening him still
e means which he employed had however some-
ontrary effect, and in one instance he showed his
ing disappointed, in very strong terms. Napoleon
er taken possession of Berlin than he issued his
ree, by which the continent of Europe was shut
intercourse with Great Britain, and which ordered
of English goods wherever they might be found.
ty of Tilsit. Frederic William was compelled to
to that monstrous decree in his remaining domi-
ugh England was nearly the only country in which
ns could sell their corn, hemp, and timber, and
expected that as Prussia had already suffered so
g the short war with England in 1806, she would
se the last chance of raising money, and thus give
ext to put the whole country under his administra-
e should have paid her debt. Just at the time
ia was reduced to such a state that the royal family
ter dinner than the humblest mechanic, and the
e and jewels were at Hamburg to be sold, an im-
ntity of English goods was discovered at Stettin,
e other sea-ports. The Prussian officers speedily
y sold them, their purchasers being mostly French-
the money thus raised—1,000,000*l.* sterling as
er 700,000*l.* according to others—was employed
hing the French debt. When Napoleon was
f the fact, he was outrageous, but it was then
seize the goods and put the money in his own

Napoleon set out on his campaign against Russia,
ric William was under the painful necessity of
oppressor and sending a body of 20,000 men to
the Emperor Alexander. At Dresden Napoleon
ed by a host of potentates. Among them was
William, but though he was obliged to bow, he
stiffly as possible, spoke very little, and by his re-
dignified behaviour increased the ill feelings of
against him.
leon had been victorious in Russia, Prussia would
peared from among the kingdoms of Europe; and
leon and Frederic William well knew that. The
ntingent fought under Marshal Macdonald, on the
eft of the French, which was operating against
e direction of St. Petersburg, and the Prussians
well as to deserve the praise of their French com-
In consequence of Napoleon's retreat from Moscow,
g of his army retreated also, but slowly. Closely
y the Russians, the Prussian general York, the
of an English family settled in Prussia, suddenly
nce with his Russian opponent, General Diebitsch,
who was afterwards created Prince Sabalkanski for
e over the Balkan in the war between Russia and
1829. A few days afterwards, 30th of December,
ded the famous convention of Posarum, in conse-
which the Prussian army retreated into Prussia, and
ies between the corps of York and Diebitsch ceased.
no authority to make such a convention, though the
etended he had acted under the orders of his
is motives were to save the Prussian army, and to
ussia from being treated as an enemy, for he knew
or never Prussia ought to break her fetters.
wrath at this unexpected event was indescribable, and he sent a threatening letter to Frederic William, demanding that York should be deprived of his command, and be tried by a court-martial for high treason. Frederic William was then in Berlin, surrounded by French troops, and disobedience to the orders of Napoleon would have brought upon him the fate of King Ferdinand VII. of Spain. He consequently declared the convention of Posarum null and void, and ordered York to be arrested. A sort of mock investigation of the case took place, but it was soon dropped, and subsequent events showed that, although without orders, York had acted according to the secret wishes of his royal master. No longer safe in Berlin, the king hastened to Breslau, where he had an affecting interview with the Emperor Alexander. On the 28th of February, 1813, he signed a treaty of peace and alliance with Alexander at Kalisch, in Poland, but as yet no war was declared against France, and the remnants of the French army, which retreated through Prussia, were hospitably received by the inhabitants, although they brought unspeakable misery over the country. At last, on the 17th of March, 1813, Frederic William declared war against France, and issued the famous proclamation to his subjects which roused the whole nation, from the proudest nobleman to the meanest ploughman, in arms against the foreign usurper, and made them ready to sacrifice their lives and the remnant of their property for the delivery of their country. The labouring classes rose in a body; the bar, the pulpit, the offices of the government, were deserted; the students in the universities and colleges stood foremost in the ranks; mere children were seen bent under the weight of a musket claiming to be enlisted, and when refused to be admitted, shedding tears and forming themselves into bodies and performing under the direction of aged veterans the duties of soldiers so as to be able to fight in a year or two when they should be strong enough to support the hardships of the field. When the French, again victorious, were burying the dead on the fields of Lutzen and Bautzen, many a veteran of Napoleon was struck with surprise when on stripping the corpse of a slain enemy, he saw the naked body of a woman clad in the rough garments of a Prussian grenadier. One feeling animated the whole Prussian population; and supported by the general enthusiasm Frederic William was at last enabled to act decidedly, because he had now only to follow his own heart and was no longer in that position where his resolution was wavering under the influence of considerations from which his intellectual powers were not strong enough to extricate himself with dignity. In two pitched battles at Lutzen, on the 2d of May, and at Bautzen, on the 20th and 21st of May, Napoleon was victorious over the combined Prussians and Russians; but neither of these victories had any important consequences for him, and so far were the allies from being downcast, that they retreated only a short distance, and immediately reassumed a threatening attitude. Where Napoleon did not command in person, and especially in the *little* war, the French were regularly beaten; and he accordingly listened to the proposition of Frederic William and Alexander to settle their differences peacefully. They made a truce at Poischwitz on the 4th of June to last till the 17th of August, and a congress was assembled at Prague under the mediation of Austria, which until then had kept a strict neutrality. Both of the belligerent parties endeavoured to draw Austria into their interest, and both of them wanted time to increase their armies in case of a new outbreak of hostilities. Napoleon having peremptorily rejected the main condition of definitive peace, namely, to give up all his conquests in Germany and to withdraw with his armies beyond the Rhine, Sweden and Austria declared for the allies; and as Napoleon had gradually augmented his forces by new levies in France, and by withdrawing 30,000 veteran troops from Spain to Germany, he broke off the negotiations, and the war commenced again on the 17th of August. The patriotic enthusiasm which first animated Prussia was then spreading over all Germany, and principally Northern Germany, whence the French had been driven out by the inhabitants immediately after Prussia's declaration of war against France; but although Marshal Davoust, and General Vandamme, surnamed the bloodhound, soon brought the people again to obedience, the allies could reckon upon a general rising at the first opportunity; and the history of the war proves that they were not mistaken. The forces of the allies in August have been estimated at 300,000 men, of which about 200,000 were Prussians; but this estimate is rather below than above the real number. The army of Napoleon was considerably less: but in the north Denmark had declared for him and damaged the operations of the allies on

that side. On the 27th of August Napoleon gained another victory at Dresden; but having advanced upon Bohemia, part of his army was entirely routed at Kulm, by the Russians, and at Nollendorf by the Prussian general Kleist. Upon this the hopes of Napoleon were blighted by one defeat after another, and in the battles of Grossbeeren, Dennewitz, Katzbach, Görde, and many others, the Prussians and their brave commander Blücher restored the honour of their arms, and reduced Napoleon to a most critical position in the neighbourhood of Leipzig. In the battle of Leipzig the French power was broken, or rather in three successive battles on the 16th, 18th and 19th of October, and there again Blücher and the Prussians obtained the greater share of glory. It was on the 18th, in the evening, when Frederic William and the emperors of Austria and Russia met on a hill near Probstheida, where the centre of the French position had been, and descending from their horses, embraced each other in the presence of their soldiers, and kneeling down, remained long in silent prayer. From Leipzig the remnants of the French army fled to the Rhine. It is generally believed that the pursuit was far from being hot enough, and it is said that had Frederic William's wishes been complied with, scarcely one regiment of the enemy would have reached the frontiers of France. The passage of the Rhine was effected by Napoleon on the 2d of November. Frederic William, urged by Blücher, advised the allies to invade France, but there was a contrary opinion at head-quarters, and two months were spent in inactivity before at last the Russo-Prussians crossed the Rhine on the 1st of January 1814. It is said that the *matériel* of the allied army was very much reduced, and that money was scarce. Yet immense stores were taken in the numerous German fortresses occupied by French garrisons which surrendered one after the other, and England supplied liberally both stores and money. The beginning of the campaign in France was signalised by the battles of Brienne and La Rothière, where Blücher once more obtained an advantage over Napoleon. Frederic William and Alexander were witnesses of the battle at Brienne. During the subsequent negotiations at Châtillon Frederic William appeared to be satisfied with moderate conditions, but Napoleon was victorious in several battles that were fought during the negotiations, and the French plenipotentiaries withdrew from Châtillon. They had acted with great spite, trying to create disunion among the allies; but their designs were fortunately seen through, and the allies now agreed by the convention of Chaumont that they would make no peace till France was reduced within her former limits; that Austria, Russia and Prussia should employ all their forces to that effect, and keep each, for the period of twenty years after the peace, an army of 150,000 men ready to enforce the conditions of such a peace, and that Great Britain should pay 5,000,000*l.* sterling. There was still a doubt at the head-quarters of the allies whether they should march upon Paris or not, the operations of Napoleon in their rear seeming to render such movement very dangerous, but Frederic William and Blücher constantly urged the necessity of finishing the war at Paris,[*] and so at last the great task was undertaken. On the 9th and 10th of March Blücher defeated Napoleon at Laon, Prince Schwarzenberg was victorious at Arcis-sur-Aube, and their united armies gained another battle at La Fère Champenoise. A few days afterwards they stormed the fortifications round Paris, and gained the battle of Mont-Martre, and on the following day, the 31st of March, Frederic William and Alexander made their triumphal entry into Paris. On the 2d of April Napoleon was deposed by the Senate.

During the negotiations that preceded the peace of Paris, Frederic William was active and prudent, but public attention was more directed to the Emperor Alexander. It appears that the king's vanity was not wounded by this, but that on the contrary he wished it, since he thus more easily avoided those intrigues by which his brilliant but less reserved friend was often ensnared. After the restoration of the Bourbons, Frederic William in company with the Emperor Alexander, several members of the Royal Prussian family, and the old field-marshal Blücher, paid a visit to England, where they were most enthusiastically received. He was present at the great banquet at the Guildhall in London. After a short stay in England he returned to Prussia, and made his triumphal
entry into Berlin, and thence proceeded to the c
Vienna, to take his seat among the distributors
vinces ceded by France at the peace of Paris.
claimed his former possessions, except the greater
share in the division of Poland, which he consent
to Russia, but he demanded, as an indemnity, the
dom of Saxony. The king of Saxony, Frederic
was then Frederic William's prisoner of war, who
punish him for his defection in 1806 and his sta
rence to Napoleon, by depriving him of his whole
and he was supported in his views by the Emperor
Both of them took so menacing an attitude in this
met with so firm a resistance from the king of
well as other potentates, that serious fears were
a rupture between Prussia and Russia on one side,
Great Britain, and France, on the other, but the
poleon from the island of Elba produced a sal
among the members of the congress, and Frede
was obliged to be satisfied with the larger and
of the kingdom of Saxony. Besides this
received back the most western part of Poland,
name of the grand-duchy of Posen, nearly all his
sessions in Germany, and several other parts of th
namely, a large tract on both sides of the Rhin
greater part of Westphalia. He also acquire
Pomerania by exchange for Lauenburg, but
small districts in the hands of some of the min
princes. Comparatively speaking Prussia acquire
the other powers, since the area of the kingdom
the treaty of Vienna was less than previous to th
Tilsit, and besides this the Prussian dominions
divided into two large portions separated from ea
a small narrow tract belonging to Hanover and He
and the opinion in Germany was that Frederic Wil
been dealt fairly with. Frederic William became
of the German confederation for all his dominions
longed to the German empire before its dissolutio
for the greater western portion of Prussia; but for
duchy of Posen, the kingdom of Prussia Proper, a
vince of Western Prussia he did not become a me
confederation.

A powerful Prussian army under Blücher wa
resist Napoleon, after his return to Paris in 1815,
therlands. Against him Napoleon aimed his fi
Ligny, on the 16th of June, and Blücher lost th
the spirit of the Prussian army was so excellent, t
retreated in good order upon Wavre, kept his wor
Duke of Wellington at the battle of Waterloo, a
glorious share in that great victory, by which th
Napoleon was broken. Frederic William followe
to Paris, and there signed with the other powers
peace of Paris. To the proposition of the Emperor
of forming that union called the Holy Allianc
William adhered with eagerness: pietists and
praised him for it; lovers of civil and political freedo
the people could not guess what the Holy Allian
and the Holy Alliance is now forgotten.

After his return Frederic William undertook t
task of organizing a kingdom composed of incong
and exhausted by oppression, rapine, war, and
exertions; and it is just to say that he had a larg
share in bringing Prussia to that state of streng
and political importance, in which he left her at
His intellectual capacities were very limited, but h
sense, loved and knew how to create order, and,
long and bitter experience, displayed remarkable ab
tinguishing things that would last from such as woul
in choosing his servants among men whose principle
a quiet and peaceable development of that state
which he had in view. In a few years the fina
brought to a flourishing condition; trade, mecha
agriculture, were promoted by liberal laws, and
were not sufficient the king would help with mone
own purse, lending or giving large sums to the g
owners in Eastern Prussia, when the high rate of
duties in England produced a stagnation of the cor
that province, and momentarily deprived the o
immense estates of the means of paying the taxes
creditors, or even of living decently. Nor was he
in reforming the administration of law and the post
constructing roads, and in founding universities, coll
schools. Unfortunately for him, public opinion in
and indeed in all Germany, with regard to civil and

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[*] It is said that the plan was originally conceived by the Russian prince Wolkonsky, who spoke of it to the Emperor Alexander, by whom Frederic William was persuaded to adhere to it. Others say that Blücher was the only *originator of* the plan, and had never had any other.

dom, became very liberal after the conclusion of the great during which the people were constantly urged to sacri- their lives and property by appeals to their antient and ises of future freedom, so that soon after the publication Confederative Act of Vienna, in which a constitutional ment was promised to all the States of the Confedera- the people expected that they would soon enjoy the dom of England or France, and showed symptoms of great ment when one year after another elapsed without bring- em a representative constitution. Their claims were ore just as they were not only founded upon their social but upon rights also, and the Prussians in particular d their right not only from the 18th Article of the derative Act, but still more directly from Frederic am's edict of the 22nd of May, issued after the return of on from Elba, and before the battle of Waterloo had ed all fear of France, wherein he promised to establish ral representative constitution for the whole kingdom. claims were most disagreeable to Frederic William, hough it may be doubted if he intended to deceive his s by illusive promises when he issued that edict, he theless broke his word, inasmuch as he never fulfilled it. ought it perhaps more prudent to leave the glory of Prussia on a level with England and France, by ipating her by a constitution, to his son and successor, esent King Frederic William IV. The reasons why ric William III. broke his solemn and royal word must nd in his character. A real representative constitution should give the nation a participation in the legislation, thing utterly detested by Frederic William. He was brought up in the old German doctrines of absolutism; never aimed at despotism or tyranny. He would be ather of his nation, the master in his house, and of he expected from his subjects that sort of obedience boys owe to their father and servants to their master. good father he gave his children a good education, ing them all sorts of amusements and liberty, and paying their little debts occasionally, but he wanted all their to be confined within the limits prescribed by himself, ny claim to go beyond he would punish with angry or the paternal cane, according to the case. There is oubt that Frederic William was actually alarmed when for a constitution became loud in Prussia, and as the le ventured to give additional weight to their claims by ing to the enthusiastic readiness which they had shown scuing him from ruin, he behaved like a father saved drowning by his son, who asks for half of his father's erty as a reward for having done his duty. When eric William promised a constitution he did not pre- y know what it was, and moreover he could not fancy his loyal Prussians would ever have the impudence to ask : this seems to be the only way of explaining why he his word.

he first to remind Frederic William of his promise were inhabitants of the Rhenish provinces, who, during the d that they were united with France, had enjoyed only uch of the benefit of a constitution as Napoleon would allow , which however, was much more than Frederic liam would allow them. Early in 1818 the inhabitants oblenz presented an address to the king in which they ly established the justice of their demand on the ground 18th Article of the Confederative Act, and the edict of 2nd of May, 1815. Upon this they received the follow- script (Cabinets-schreiben) from the king:

either the eighteenth article of the Confederative Act, e edict of the 22nd of May, 1815, fixes the time when presentative constitution shall be introduced. Not every is the right time for making alterations in the constitution e state. He who reminds the king,* who has voluntarily ised a constitution, of his word, manifests criminal doubts e inviolability of his word, and anticipates his decision on ght time of its introduction; a decision which ought to free as was his first promise. Your petition could not but my just indignation. I myself will fix the time when I realize my promise of giving a representative constitution y kingdom, and I shall not allow myself to be anticipated thers in my quiet advance towards my aim. It is duty of my subjects to wait with confidence in my own will, which led to the promise to which you allude, as as to the above-named article of the Confederative Act, till the time shall come which I, guided by my knowledge of the whole organisation of the state, shall think fit for fulfilling my promise.'

The time so clearly alluded to by Frederic William has not yet arrived. The attention of the public has lately been drawn to the king's conduct in these matters by a little pamphlet, 'Das Königliche Wort Friedrich Wilhelm's III.,' the author of which is Mr. Jacobi, an advocate of repute at Königsberg. While Frederic William thus evaded his promise to grant constitutional liberties to his subjects, he indirectly checked the spirit of liberalism in other parts of Germany, and was especially active in putting down the secret societies among the students in the universities, especially the society called 'Burschenschaft,' the object of which was the gradual regeneration of Germany, and the political independence of the whole nation under one government. It has been pretended, but it is not true, that that society intended to prepare the people for a democracy; for, though some of the conspirators might have formed such plans, the democratical tendency of the 'Burschenschaft' became prevalen only after the French revolution in 1830. The liberty of the press was likewise restrained by Prussia; and generally Frederic William was one of the chief promoters of the objects of the congress of Karlsbad, in 1819, where the plenipotentiaries of the German princes enslaved the press, and resolved upon the appointment of a permanent commission resident at Mainz, which was to prosecute and try students and other young men who had taken part in secret political societies. A special commission for Prussia was soon afterwards appointed by the king at Köpenick, near Berlin, and the dungeons of that town were soon filled with victims, chiefly belonging to the best families of the country. The people were the less prepared for such proceedings, as in the year previous to the congress of Karlsbad, Prussia had shown, by her conduct at the congress of Aix-la-Chapelle, that she no longer dreaded the direct political influence of France, since Frederic William consented to reduce the debt due by France to the formerly allied powers, and to withdraw his troops, together with those of Great Britain and the other allied powers, from the French soil. In 1820, and in the following years, the continental kings held successively the congresses of Troppau, Laibach, and Verona, where measures were taken against the political movements in Italy and Spain, and here again Frederic William showed that he hated representative constitutions in those countries no less than in his own. Prussia was astonished and indignant at this conduct in a king who owed his crown and his glory, nay his very honour, to promises of political liberty, and upon whom all Germany looked as a shield against despotism and oppression. Had Frederic William followed the course which he took in 1813, his name would have remained unsullied. But no sooner had peace been concluded than numerous Prussians, who had only affected liberalism during the war, or thought they were liberal and patriotic because they hated their former French oppressors, raised their heads and their claims. Between them and the liberal party the king was wavering for some time, with his accustomed want of decision in complicated matters, till he fell in with the Protestant pietists. From this time the spirit of the Prussian government became what it is now still more, a sort of Jesuitical despotism, dressed in the smooth garb of piety and philosophy, and decoying with titles and orders of knighthood, where the Bible was read in a different sense, or the court philosophy of Hegel declared to be unintelligible. It may be doubted if Frederic William saw that he would be acting like a despot while he thought he was only following the advice of his confessor, or realizing the sublime ideas of a school of philosophy by which the Prussian Code was declared to be an emanation of God, and divine in its meanest details (Sietze, *Philosophie des Preussischen Landrechts*); but it is unfortunately a fact that he adopted despotic measures of a most revolting character. One of the most glaring instances of this is the forced union of the Lutheran and Reformed churches, or the introduction of the new 'agenda,' as it was gently called, a violation of the liberty of conscience which in another age would have led to a religious war, and which even those would despair of justifying who are partisans of the monstrous theory, though it is admitted in Germany, that the Roman Catholic bishops having lost their ecclesiastical jurisdiction in the countries reformed by Luther, the Protestant princes had succeeded to episcopal jurisdiction in those countries. The persecutions by which Frederic William's government attained their object were numberless, but there is no space here to dwell longer upon the subject: gentlemen holding or aspiring to hold offices under government, and refusing to adhere to the new Evangelical church, were either not promoted or entirely disregarded; many clergymen, and among them men of great repute, who opposed the introduction of the agenda into their churches, were deposed; and at last a decree was issued, in 1827, by which no clergyman could receive any living till he had taken an oath to perform the rites of the agenda. Those who were most ready in conforming to the rules of the new church were rewarded with pensions, titles, and the cross of the order of the Red Eagle, and thus the poet Heine said that the new agenda was flying on the wings of a red eagle from steeple to steeple to all the churches of Prussia. Indeed, so great was the respect of the Prussians for the divine character of their government, that the Evangelical church was established in a few years in most of the Protestant districts of the kingdom. Frederic William is said to have been the originator of the new church, and to have considered it as his greatest work. Contemporary with this ecclesiastical reform was the establishment of the 'Landstände,' or provincial estates, a sort of paltry middle-age representation of the people in each province, but not a general representation of the whole nation. The provincial estates have only deliberative power, and are treated by the government with so little regard, that they are not allowed to make their meetings public, or to publish their debates through the press. The people called the states 'die Jaherren,' meaning gentlemen who always say Yes, and the following anecdote will show how they were considered by some of the great officers of the state. During the meeting of the States of Westphalia, the parliamentary debates were suddenly interrupted by the appearance of a general in full dress, who was no member of the States, but nevertheless boldly advanced towards the speaker, and addressed the assembly. It was the military governor of the province, the General Baron von Müffling, one of the heroes of 1813—1815, who thus intruded upon the representatives of the people, and impudently told them to remember that their first duty was obedience to the king, and that non-compliance with his wishes was little better than high treason. He was with difficulty removed from the hall, but nobody dared to prosecute him for his offence, nor would such a step have been of any avail. A striking instance of Frederic William's misconception of the reciprocal 'obligations between king and subject,' was his conduct towards the inhabitants of the Rhenish provinces. On getting possession of this fine tract, he solemnly declared that they should continue to live under the French code, but it is only due to the manly resistance of the Rhenish people that they have not been deprived of their laws, and yet they have not been strong enough to prevent several alterations contrary to the very spirit of the French Code, and intended to give support to absolutism, and to create a privileged landed aristocracy. We allude to the decree of Frederic William by which the jurisdiction over public functionaries in criminal cases was withdrawn from the courts in those provinces where, as in England, the accused is tried by a jury of twelve men; by the same decree these courts were deprived of power to try persons guilty of political offences, in which cases judgment is now given by a special commission appointed by the king; and, lastly, by the decree of 1836, there was established an equestrian order in those provinces, by conferring upon nobles possessed of a certain extent of landed property the privilege of erecting them into fidei commissa; also the privilege of autonomy, that is of fixing rules of succession, and making certain family regulations, contrary to the common law of succession, as well as that referring to landed property. For according to the French law, lands in Rhenish Prussia are divided among the heirs either male or female of the deceased owner, in equal parts, according to the degree of consanguinity, just as personal property is in England.

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* The German word is 'Landesherr,' lord of the country, an old term, but n general use, although disliked by the present generation, because it es an idea of conquest and feudal despotism.

In matters of judicial reform, the king unfortunately listened too much to the advice of Von Camptz, whose name is branded in Germany as the principal persecutor of young men suspected of belonging to secret societies, and who for a considerable period held the office of minister of justice. The consequence of this line of policy was that Frederic William was detested in his Rhenish provinces. He returned their aversion by the same feeling towards them, for he could not understand why he was disliked; he thought his paternal care for their welfare was rewarded with ingratitude. The king indeed did much for those provinces. Previous to the French revolution they were under the government of some ecclesiastical princes, and
the people were kept in such a state of ignoranc
clergy that they became proverbial in Germany; t
literature they contributed nothing, but spent thei
the enjoyment of sensual pleasures; the highe
however loved the fine arts, especially music. D
French occupation they made no progress, excep
appreciation of civil and political liberty; but they c
neither literature nor science, except mathemati
even lost their taste for the fine arts. Neither the
French government did anything for learning: tra
culture, and manufactures were languishing; the tow
decaying, and streets deserted and covered with gra
country swarmed with smugglers and swindlers, w
livelihood or enriched themselves by all sorts of j
the military government of Napoleon and his unscrupu
rapacious functionaries. No sooner had Prussia got p
of these countries than this immoral state of things cea
the new-established schools no teachers could be foun
country, and they were consequently invited from ot
of Germany, and this created jealousy in the Rhenish
Most of the functionaries of Napoleon being eithe
cated or men of bad character, Frederic William
provide others from among his old subjects, and no
appointed to any office of importance unless he had
a university education—a thing almost unknown in the
provinces, and this caused disappointment and anger a
Rhenish people. Lastly, the host of speculators w
pelled to live only on their ill-gotten riches in well
shame and obscurity: or when poor, to get a livel
honest occupations, which they could not, or to starv
they would not: and thus arose slander, hatred, and
the Prussian government. In addition to all this, ther
difference of religion, and the attempt of the Prussia
ment to reduce the Roman Catholic religion, whic
fessed by the majority of the people in Rhenish Pru
religion of the lower classes, and so create by all sorts
ical stratagems a Protestant gentry and nobility.
dwelt longer upon these topics since Frederic Wi
his government have been attacked in the Rhenish
chiefly through the medium of the Belgian pre
venomous a manner, as to puzzle or mislead tho
studying the life of that king would resort to B
Belgian sources without knowing the causes of the
tent. There is, however, no doubt that from th
Frederic William was restored to his throne by his
lost his popularity more and more, and gave occasi
censure.

Small as the political liberties of Prussia
vexatious as the military system was which reigned
out the whole administration, a period of fifteen
sufficient for Frederic William and his councillors
Prussia again to the rank which she occupied a
powers of Europe previous to the battle of Jena.
exterior relations Prussia behaved with prudence an
The object of Frederic William was to make Pruss
ful, and he succeeded. He was an advocate of the
their struggle against the Turks, because he saw i
nation that was throwing off the yoke of insupportabl
imposed upon them by a people who were not Christi
he was active and successful in bringing Turkey to te
Russia in 1829, since he dreaded a European w
would have thwarted his plans for the improvement of
dom. Peace was the great object he had constantly
and he maintained peace even through the dangers oc
by the French revolution in 1830. Though certain
to the principles of the French Revolution, he
himself with keeping the French within France, by
that he would make common cause with Austria an
against her from the moment the French made thei
European one by continuing to revolutionize Europ
her emissaries. He had to experience the danger
French Propaganda in a riot at Aix-la-Chapelle, w
the first and also last outbreak of a well-organized
revolutionize the Rhenish provinces. He was
blamed for having been a quiet spectator of the
entering Belgium in 1832, and taking Antwerp
Dutch; but in this case again he was bound to neut
his own principles, as well as by his agreements w
powers. If he deserved blame, it was for having s
those principles, during the last Polish revolution, wh
only supplied the Russian army with provisions and
stores, but allowed the Russian generalissimo, Field
Paskiewicz, to cross the Vistula on the Prussian

h enabled him thus to attack Warsaw and to put down the rection. A great number of Polish subjects of Frederic iam, having joined the army of their brethren in Russia, severely punished when they returned to Prussia after all of Warsaw; but many Prussians who had fought in French army against the Arabs and Kabyles in Algeria not punished; and Frederic William was so far from ifying the causes of the Poles and the Algerians, that lowed many officers to help the French in taking pos- n of that country. During the disturbances caused in any through the effects of the French revolution, ric William showed himself a decided though not t adversary of constitutional reforms; and the consti- s of Saxony, Baden, Hesse, Würtemberg, and several states having been made more free than they were usly, he secretly aided the princes of those countries in ttempts to bring them back to their former condition as s circumstances allowed him to do so.

vards the end of his reign Frederic William committed of palpable despotism and injustice, which created a sensation in Europe, by arresting and imprisoning the ishop of Cologne, the Baron Clement Augustus von -Vischering, for his energetic conduct in the disputes xed marriages. The archbishop of Gnesen, Mr. Von , imitated the example of the archbishop of Cologne, as treated in the same way. The causes which led to disturbances are by no means so complicated as the s in the pay of the Prussian government tried to per- the public. According to the concordat of 1820, be- Pope Pius VII. and Frederic William III., the issue xed marriages was to follow the religion of the father, the parents agreed otherwise; and the Roman Catholic s were enjoined not to withhold their blessing from such ages. But when it became evident that by appointing proportionate number of Protestant functionaries in the n Catholic provinces, and encouraging Protestant gen- n, especially bachelors, to settle in those parts, the Prus- government intended to create a Protestant gentry in provinces, and to confine the Roman Catholic religion e lower classes, then the archbishop enjoined his y to withhold their blessing from mixed marriages, unless hildren were to be brought up in the Roman Catholic on. The archbishop's intention was plainly to prevent Protestant gentlemen who could not easily conclude a age except with Roman Catholic ladies, from bringing up any Protestant families. It is true that the king ap- ed a considerable number of Roman Catholic gentlemen blic places in the Protestant provinces; but as the go- ment took more care in establishing Protestant churches schools in the Roman Catholic provinces than Roman olic churches and schools in the Protestant provinces, an Catholic gentlemen living in Protestant districts had no opportunity of bringing their children up in their own ion, and consequently consented to their being educated e Protestant religion. Annoyed by this policy of the ishop of Cologne, the Prussian government set spies his transactions with the Belgian clergy; and as spies ways liars, and act from dishonest motives, they made plot and represented the archbishop as if he belonged to ague of Belgian Ultra-Montanists and democrats, and led to kindle, with their help, a revolution in the Rhen- rovinces. This led to the sudden arrest and extra- al imprisonment of the archbishop. The affair was between the Pope and the present king in such a as to leave no doubt that Frederic William had not acted unjustly, but also very imprudently, as he had taken a thing which neither he nor his successor had to carry out. As a consequence of these disturbances, ric William lost the last remnant of his popularity g his Roman Catholic subjects, the number of which ut five millions. His policy in promoting the material re of his subjects was wiser; and never have the trade, factures, agriculture, and navigation of Prussia been in urishing a condition as towards the close of his reign. ttained his object in a great measure by concluding a ercial league with most of the other German states, the of which was originally conceived by the late minister of es, Mr. Von Maassen, and which is known under the of the 'Zollverein.'

oken down by the infirmities of age, Frederic William died after a short illness, on the 7th of June, 1840, still ed by many of his subjects in the antient dominions of louse of Brandenburg. He was twice married. By his first wife, Louisa of Mecklenburg-Strelitz, he had four sons, the eldest of whom is the present King Frederic William IV., and three daughters. His second wife was Auguste, Countess von Harrach, created Princess of Liegnitz, with whom he was united, in 1824, in morganatic marriage, and by whom he had no issue.

Frederic William was the model of a good husband and father, and by his domestic virtues he often regained the hearts of those whom he had alienated from him by his political conduct. Although his political principles were those of an absolute king, and consequently not always in harmony with truth and justice, he was upright in the application of established principles to particular cases, and he proved a good arbiter in several questions between foreign powers which he was chosen to decide. His person was commanding; he was rather goodlooking, but his features were harsh, and he was more like a general than a king. He did not speak well, and it required long experience to understand his questions, and to guess the meaning of his answers. He disdained pomp and pageantry: in an unseemly dark-coloured carriage drawn by two ordinary brown horses, and seldom accompanied by more than one servant or attendant, he used to drive through the streets of Berlin, unobserved by all except those who happened to know the conveyance. His moral principles were pure, and his private conduct was an example to all his subjects. The dissolute and insolent conduct of some of his sons often roused his anger. Frederic William was pious, and his piety was certainly sincere. Although surrounded by philosophers and enlightened divines, he was rather superstitious; and we cannot refrain from finishing this sketch of his life by the following anecdote, which we give on the faith of the well-informed author of his biography in 'Neuer Nekrolog der Deutschen.' During his sojourn in Paris he used to talk much with the celebrated Mademoiselle Lenormand. She once told him that Napoleon would die in 1821, and he in 1840. This prediction having proved true as to the death of Napoleon, Frederic William was convinced that he would die in 1840. In the beginning of that year the king gave a great entertainment in his palace at Potsdam, and while he was quietly listening to the performance of some musicians, a large marble stone fell from the ceiling of the hall at the feet of the king, who immediately left the room, saying it was a bad omen, and foreboded his death. Soon afterwards a rumour was spread in Berlin that the 'White Lady' had made her appearance. The 'White Lady,' according to an old belief, is a ghost which appears in the royal palace at Berlin shortly before the death of a member of the royal family; and the people believe that every case of death in the House of Brandenburg has been, and will be, announced by that mysterious being. The king was then already very weak, and great care was taken to prevent the rumour from reaching his ears; but he was nevertheless informed of it, and from that moment became the prey of a deep melancholy, which may have accelerated his death, for he died a few weeks afterwards.

All works published on Frederic William, or the history of Prussia generally, since the accession of the present king, ought to be read with great caution; for a law has been issued by Frederic William IV. which forbids any person to speak disrespectfully of any king of Prussia, either alive or dead, under a severe penalty. Speaking disrespectfully means, of course, mentioning or blaming the faults of a king.

(*Geschichte der Preussischen Monarchie unter Friedrich Wilhelm III.*, Berlin, 1825; Zedtlitz, *Die Staatskräfte der Preussischen Monarchie unter Friedrich Wilhelm III.*, Berlin, 1828; *Histoire de la Prusse*, 3 vols., Paris, 1828; *La Prusse et sa Neutralité*, London, 1800; *Matériaux pour servir à l'Histoire des années* 1805-7, Paris, 1808 (by a Prussian gentleman of distinction); Sir Robert Adair, *Historical Memoir of a Mission to the Court of Vienna in* 1806, London, 1844; Eylert, Bishop, *Character-Züge aus dem Leben Friedrich Wilhelm's III.*, &c.; this book, the panegyrical work of a court preacher, ought to be perused with more than a moderate degree of distrust: there is an English translation of it.)

FREE CHURCH OF SCOTLAND, the name adopted by a large body of clergy and laity who seceded from the Church of Scotland in 1843. The history of this secession is as follows. It was part of the policy of the Harley ministry, in Queen Anne's reign, to encourage the Episcopal party and the landed gentry of Scotland, and to depress the Presbyterian. In 1712 they accordingly passed an act (10 Anne, c. 12) restoring to its full vigour the right of lay patronage, which had been virtually abolished in 1690. The church became thenceforward divided into two parties, the supporters of patronage, or the 'Moderates,' and the anti-patronage men, or, as they were more lately termed, 'Nonintrusionists.' In 1834 the latter party obtained the majority in the General Assembly, and on the 31st of May of that year the Assembly passed an 'Overture and Interim Act on Calls,' a measure generally known by the name of the 'Veto Act.'

To understand the character of this measure, it is necessary to keep in view the method of collating a qualified person to a benefice in Scotland. The licensing of a clergyman, and his ordination and induction to a benefice, are distinct acts. Many clergymen are licensed to preach who never obtain benefices, and in this position they are called 'probationers.' When a licentiate receives a presentation to a benefice, he presents it, along with an acceptance, to the presbytery within which it lies, and they pronounce a sentence sustaining the presentation, and appointing such formalities as the laws of the church sanction, before the presentee is finally ordained and inducted to the benefice. The object of the Veto Act was to make it a law of the church that no presentee was to be held fit to be ordained as minister of a parish unless he were acceptable to the majority of the parishioners. Accordingly, by the Veto Act and other rules for carrying out its principles, presbyteries were directed, when a presentee laid his presentation before them, to appoint him to preach twice in the church, and also to appoint a day for 'moderating in a call,' or receiving dissents. If a majority of the male heads of families in the parish in communion with the church dissented, the presentee was to be rejected as an unfit person. There was no doubt that it was within the power of the General Assembly to settle what qualifications should be required, in the way of education, character, &c., of every presentee; but the question came to be, whether the church was entitled to require such an external test as the acceptability to the parishioners, and thus virtually counteract an act of parliament under which important civil rights were held.

On the 14th of September, 1834, Lord Kinnoul, patron of the parish of Auchterarder in Perthshire, issued a presentation to that parish in favour of Mr. Young. The presbytery applied the Veto Act to this presentation, and it was found that in a roll of 330 male heads of families, 287 dissented and objected to the presentee's ordination. The presbytery accordingly rejected the presentee. An appeal against these proceedings was taken to the immediately superior ecclesiastical court, the Synod, and thence to the General Assembly, but the acts of the presbytery were confirmed in both these courts. The next step was to call in question the proceedings of these ecclesiastical tribunals in the civil courts. Accordingly an action of declarator was raised in the Court of Session by the patron and the presentee, and on the 5th of March, 1838, the court, by a majority of eight to five, found that the presbytery, in rejecting the presentee on the sole ground that the male heads of families in communion with the church had dissented without assigning reasons, had acted to the hurt and prejudice of the pursuers, illegally, in violation of their duty, and contrary to statute. On the 3rd of May, 1839, this decision was affirmed on appeal in the House of Lords. Mr. Young afterwards raised an action of damages against the presbytery, on the ground of his having been a sufferer by their illegal conduct, and obtained a verdict in his favour. This was called 'the Auchterarder case.' The presbytery had refused to retrace their steps, and had inducted another person before preventive legal measures could be taken in the matter. But the Lethendy case took a different shape. In 1835 Mr. Clark received a presentation to that parish from the crown, in which the patronage was vested. A majority having dissented, he was rejected by the presbytery. In the mean time the crown, yielding to these proceedings as legal, issued a presentation to another person; and thus the two presentees were able to fight the battle of the legality as a question of patrimonial right. Mr. Clark not only brought an action into court, as had been done in the Auchterarder case, but he likewise applied for an interdict, the counterpart of what is in England called an injunction, and the Court of Session accordingly interdicted the second presentee from presenting himself, and the presbytery from inducting him. The presbytery applied to the General Assembly for instructions, and the Assembly directed them to disregard the interdict of the Court of Session, and to put in force the Veto Act. They therefore proceeded with the induction of the *second presentee.* On this the majority of the presbytery were cited to appear before the Court of Session, to answer to a complaint for breach of interdict; and on the 14th of June, 1839, they were reprimanded at the bar of the court, and informed that a repetition of the offence would be followed by imprisonment.

The celebrated Strathbogie case assumed an aspect considerably different. In June, 1837, Mr. Edwards received a presentation to the parish of Marnoch, which he laid before the presbytery of Strathbogie, the majority of whom were opponents of the Veto Act. A majority of the communicants having vetoed Mr. Edwards, the presbytery, by the direction of the superior church courts, rejected him. A second presentation to a different person was granted by the patron, but Mr. Edwards, as in the case of Lethendy, obtained an interdict against the presbytery taking any steps against the second presentee, and raised an action to have it declared that his own rejection was illegal. In these circumstances the presbytery resolved to postpone their proceedings until the courts of law had given final judgment. Mr. Edwards obtained a decree to the effect that the refusal of the presbytery to take him on trial and induct him was to his hurt and prejudice, illegal, in violation of duty, &c., and enjoining them to take him on trial, and act as if no law of the church such as the Veto Act existed. The presbytery applied to the superior church courts, which directed them still to put the Veto Act in force. Thus, being directed by the courts of law to take a particular step, and by the superior ecclesiastical judicatories to take one in the reverse direction, the presbytery would of course act as their own views of a proper jurisdiction in the matter might direct. The majority being of the moderate party, they decided by a majority that they would obey the courts of law, and they consequently took Mr. Edwards on trial, and inducted him. Then occurred an event from which every one saw that the Church of Scotland must inevitably be split in two. On the 13th Dec. 1839, the commission of the General Assembly suspended the majority of the presbytery of Strathbogie from their ecclesiastical functions, directed other clergymen to perform their duties, and declared the minority of the presbytery to be entitled to perform the corporate functions of the presbytery. On the 27th May, 1841, this suspension was made perpetual by the General Assembly deposing the members of the majority of the presbytery, and recalling Mr. Edwards's licence as a preacher. In the mean time the court of session interdicted the practical application of these proceedings of the ecclesiastical courts, directing the interdicts against any clergymen of the established church usurping the functions of the majority of the presbytery of Strathbogie, whether individually or collectively. The execution of the sentence of deposition by the General Assembly was also interdicted. Thus the presbytery of Strathbogie was divided into two bodies—the one supported by the superior ecclesiastical courts, the other by the court of session. Both returned representatives to the ensuing General Assembly of 1842, but it was of course only the former who were declared by the Assembly to be duly elected, while the civil court interdicted them from sitting as members of the Assembly.

At the same meeting of the Assembly, in 1842, a vote was carried by 216 to 147, to the effect that patronage ought to be abolished. At the same time the Assembly issued a document called a 'claim of right,' against the 'encroachment of the civil courts,' which was transmitted to the government, and answered by the secretary of state for the home department, who left no hope in the minds of the non-intrusion party that their demands would be complied with. Some attempts were made in parliament to carry a measure for legalising the Veto Act, but they may be said scarcely to have had the support of any party, for those who held that the ecclesiastical courts were competent to pass such a measure into a law were not inclined practically to admit their incompetency by soliciting the intervention of Parliament. A further step was in progress in the civil courts. They had already protected individuals from the effects of the acts of the church courts by prohibiting these acts from being put in execution. Proceedings were commenced for having these acts of the ecclesiastical courts annulled by the civil tribunals as courts of last resort, to which those who felt themselves injured by the proceedings of any of the constituted judicatories might apply. The court indicated that it would give redress, but these proceedings were suddenly stopped by the event called the 'Disruption.'

It is the practice for the General Assembly to meet on the third Thursday of May. On its so meeting, on the 18th of May, 1843, before the roll of members was made up, the late Dr. Welsh, professor of church history in the university of Edinburgh, who had been moderator or chairman of the

ing Assembly, read a protest against the constitution of
sembly, signed by 120 ministers and 73 lay elders.
of this protest being left with the clerk of the As-
, those who had signed it, and their adherents, left the
ly in a body, and constituted in another place 'the
Assembly of the Free Church of Scotland,' choosing
almers as their moderator. This step is presumed to
en taken in consequence of the tactics laid down in the
tions of a considerable body of the non-intrusion party
d met at Edinburgh on the 17th of the previous No-
, and conducted its proceedings with closed doors,
alled a 'convention of ministers and elders of the
of Scotland.' On the 23rd of May an 'act of sepa-
nd deed of demission' was adopted by the General
ly of the free church, and signed not only by those
en who were members of the Assembly, but by others
ticipated in their views. Thus no difficulties were put
ay of a complete separation of these persons from the
and burdens of the establishment. Whatever previous
ces of opinion existed, and whatever objections there
a body such as the General Assembly of the Church
and, entitled to legislate and adjudicate for its own in-
and according to its own feelings, being exempt from
trol of the courts of law, the sacrifice of emolument and
thus made elicited general respect and sympathy, and
ditable to the sincerity of those who made it. The free
are now in possession of large sums supplied by volun-
ntributions, and are widely extending their operations.

EE-TOWN. [Sierra Leone, P. C.]

EE TRADE. [Agriculture, P. C. S.; Capital,
S.; Corn Trade, P. C.; Corn Trade, Ancient,
; Demand and Supply, P. C. S.; Leases, P. C. S.;
oly, P. C.]

EEMAN. [Boroughs of England and Wales, P. C.]

EEZING-APPARATUS, an air-pump which was
ed by Professor (Sir John) Leslie for the purpose of
liquids in vacuo.

well known that liquids evaporate more readily when
osphere is removed from their surfaces than when they
ect to its pressure; the caloric producing the evapo-
being that which exists in the liquid itself, and that
in consequence of the disturbance of the equilibrium,
the liquid from the neighbouring bodies: hence, if
a quantity of liquid æther in a vessel under the re-
f an air-pump, and in it there be placed a vessel or
taining a small quantity of water; on exhausting the
, the æther will rapidly evaporate, and, the operation
usting being continued, the vapour will be carried off
s it is formed. The caloric in the water is withdrawn
ame time, and at length the water is converted into ice.
der to produce the congelation of water by a rapid
tion from its own surface under the exhausted receiver
ir pump, Professor Leslie introduced in the receiver
ow vessel containing highly concentrated sulphuric
ove which was placed the vessel containing the water.
being extracted as quickly as possible, the vapour,
in consequence of the removal of the pressure, escaped
ally from the water, even at the medium temperature
atmosphere, was, by the strong attraction of the acid
bsorbed as fast as it rose; and in two or three minutes
ntity withdrawn from the water was sufficient to allow
lation of the water to take place. Instead of sulphuric
y substance which, as dry potash, muriate of lime, or
powder of basalt, has a strong attraction for humidity,
used; but the first, if highly concentrated, is said to
most efficacious.

air-pump employed for the purpose by Professor
was constructed in the usual manner, but of large di-
s, in order to obtain ice in considerable quantities, and
eiver was a segment less than a hemisphere, that the
ained in it might be extracted as speedily as possible.
lphuric acid or absorbent earth was contained in a
vessel of glass, nearly equal in diameter to the base
eceiver; and from the centre of the vessel rose a hol-
inder, on the top of which, above the acid or earth,
the cup of glass, or rather of unglazed earthenware,
ontained the water to be frozen. Several machines
kind have been exported to India, to be used for the
of obtaining ice in that country.

e, by means of the like apparatus, succeeded in freez-
rcury by the absorption of caloric from a coating of
hich the bulb of a thermometer was enveloped. In
rformance of this experiment the thermometer was suspended from a wire which, passing through a collar of leathers at the top of the receiver, could be raised and lowered at pleasure. A cup of water was placed above the vessel containing the sulphuric acid, and the bulb of the thermometer, after being lowered into the cup, was drawn up and suffered to lose caloric by the evaporation of the adhering water, in the exhausted receiver: this process being repeated several times, the bulb was at length covered with a film of ice. The cup of water was then removed, and the thermometer, having its bulb thus covered, was allowed to remain suspended about half an hour above the sulphuric acid, the exhaustion of the air being made as complete as possible, so that the column of mercury in the barometer-gauge was within 1-20th inch as high as in a barometer which indicated the density of the external air. On re-admitting the air, and removing the receiver, a portion of the mercury in the ball of the thermometer was found to be frozen.

Such experiments have since been more effectually performed by enclosing mercury in a mass of ice worked by heat in the form of a cup, and suspended above the sulphuric acid in a small net made of wire: the mercury was introduced into the cup of ice, and on it was poured a small quantity of water: on exhausting the receiver, the water was immediately frozen, so that the mercury was then completely enveloped with ice; and in a few minutes, on removing the receiver, the mercury was found to be wholly frozen.

For the details of Leslie's experiments see his 'Short Account of Experiments, &c. on the relations of Air to Heat and Moisture,' Edinburgh, 1813.

FREIGHT. [Ships, P. C.]

FRESCO. A painting is said to be *a fresco*, or painted in fresco (*sul fresco intonaco*, upon the fresh coat), when it is executed in water-colours upon a freshly plastered wall, while the plaster is still wet; or upon wet plaster spread upon a wooden frame or any other object. Fresco is the most noble and imposing of all methods of painting. *Colouring* in fresco was practised by the antients, though it has not yet been shown that they *painted frescoes*. Some of the walls at Pompeii are coloured in fresco, but their decorations are executed in some species of tempera upon the fresco coloured wall. This is evident, because in many places the paintings have cracked off, and exposed the original colouring of the ground in perfect freshness, and the same as the rest of the wall where no decorations are painted. The Roman term equivalent to fresco is *udo tectorio*, and it is used by Pliny (*Hist. Nat.* xxxv. 31), who gives directions as to what colours it is safe or unsafe to apply in this manner. Vitruvius (vii. 3) explains the mode of preparing the walls for this species of colouring, and describes a method of varnishing them when coloured, to preserve them. They first covered the wall with a layer of ordinary plaster, over which, when dry, they placed successively three other layers, of a finer quality, mixed with sand; above these they placed again three layers or coats, of a composition of chalk and marble-dust, the upper coats in this case being each added before the under one was dry, and successively of finer qualities. By this elaborate process the plaster formed a solid mass, as it were, of marble; was capable of being cut away and transported in a wooden frame to any distance; and sometimes even tables were formed of it. (Vitruvius ii. 8; Pliny, xxxv. 49.).

The process of varnishing the walls when coloured, Vitruvius terms (vii. 9) a Greek practice, called *καῦσις*, 'a burning.' When the wall was coloured and dry, Punic, or purified and bleached, wax, melted and tempered with a little oil, was rubbed over it with a hard brush; this was made smooth and even by applying a *cauterium*, or iron pan filled with live coals, to the surface, near enough to melt the wax. It was then polished with a linen cloth.

1. *Walls.*—Fresco was not generally practised by the early Italian painters, and it appears to have been first used in the fourteenth century, simply as a preparatory process, the work being finished in *tempera*. The earliest frescoes are in the church of Assisi, in the cathedrals of Orvieto and Siena, in the Campo Santo at Pisa, and in San Miniato and Santo Spirito at Florence. These and other later frescoes are painted on four different kinds of walls: in the old gothic buildings, on ashlar walls covered with a thin coat of plaster; in more recent buildings, on brick and rubble walls; and in some of the most recent edifices, on lath covered with various thicknesses of plaster. In many instances the walls are very uneven, and no attempt has been made by the plasterer to correct this defect so detrimental to the appearance and pre-

servation of a painting, through the settlement of dirt and the injury it undergoes in cleaning. The plaster is liable to fall away from ashlar walls, especially if the stones are large and the joints close, as in the cathedrals of Siena and Orvieto; in the church of Assisi, where the stones are small and not closely jointed, the plaster has a better hold and is generally still firm, but ashlar walls condense the damp and are the worst of all walls for frescoes; brick, rubble, and lath are much better, and nearly all equally good if well constructed. Mr. Wilson, the director of the Government School of Design, in his report to Her Majesty's Commissioners on the Fine Arts, respecting the state of the middle age frescoes and other mural paintings—to inquire into which subject he was expressly sent into Italy—ascertained upon what species of wall the various frescoes of the most eminent Italian painters were executed, and has reported as to the present condition of those works, with reference to the walls on which they are painted, and the result is, that those executed on brick are the most general, and in the best state of preservation: equality of surface is a great advantage which the brick wall has over the rubble wall. Many of the best of the old frescoes however are upon rubble walls, and unfortunately upon badly constructed walls of this description, as those of Santa Maria Novella at Florence and St. Cecilia at Bologna. The older walls of the Vatican are of rubble, or of alternate courses of rubble and brick, or rubble and tufo, a coarse porous volcanic stone, and are thickly coated with rough-cast, or coarse plaster of sand and lime mixed.

The Trionfo della Morte, by Orcagna, in the Campo Santo at Pisa, is painted upon lath, and is the best preserved fresco there. By this provision his work was protected from the damp which rises from the soil, and that which infiltrates from the roof: the sea air therefore cannot have injured the other frescoes, or it would have injured this likewise. There are many frescoes at Florence and at Venice, on lath, and all are in tolerable preservation; many vaulted or coved ceilings are of lath, plastered above as well as below.

2. *Plaster and Lime.*—The method of plastering the walls for painting has been nearly uniform in most ages. The walls of the baths of Titus at Rome are covered first with a layer about half an inch thick of coarse sand and lime; above this a thicker layer of lime and pozzolana with an admixture of sand and pounded brick; the third and upper coat is of lime and pounded marble. The third loggia of the Vatican, painted by Giovanni da Udine, is much the same as this; the first layer upon the lath is a thin coat of coarse sand and lime, the second is also a thin coat of lime and pozzolana, and the third is of lime and marble-dust, but not finely pulverized.

In all plastering for fresco painting the lime should be rather old, even in the first coat or rough-cast; but it is indispensable in the last coat, or *intonaco*, upon which the painting is executed. Various directions are given by writers on art as to the proportions of lime and other materials for the several coats, and they all agree in essentials. The oldest writers are Cennino Cennini and Leon Battista Alberti. Cennini's 'Trattato della Pittura' was written in 1437, but was first published in Rome by the Cavaliere Tambroni in 1821; the work of Alberti, 'De Re Edificatoriâ,' though written after the treatise of Cennini, was published shortly after Alberti's death, in 1485, by his brother Bernardo.

Cennini recommends that both lime and sand should be well sifted, and if the lime be rich or recently slaked, that there should be two parts of sand to one of lime; that enough for fifteen or twenty days should be prepared at a time, and that it should be kept for some days to render it less caustic, for if too caustic, the *intonaco* will blister. Alberti speaks of three coats as necessary: in the first, or rough-cast, he recommends the use of pit sand and pounded bricks; in the second, or sand-coat, he recommends river sand; in the third coat, which should be white, he recommends pounded white marble instead of sand; but finely sifted well-washed river sand makes a superior *intonaco*: these three coats were called by the Italians—the *rinzaffato*, rough-coat; the *arriciato*, sand-coat; and the *intonaco*, the fresco ground. Cennini speaks only of two coats, both of which he terms *intonaco*. Similar directions in essentials are given by Armenini, in his treatise 'De' Veri Precetti della Pittura,' Ravenna, 1587; at the end of the treatise on perspective, 'La Prospettiva,' by Andrea Pozzo, Rome, 1693; and in still greater detail by Palomino, in his work 'El Museo Pictorico y Escala Optica,' Madrid, 1715. Various other writers also have given more or less concise directions for fresco painting, but they contain scarcely any information that is not given at greater length in the above-mentioned works, from which Mr. E given several important extracts in an Appendix port of the Commissioners on the Fine Arts for 18 is however no occasion to repeat them here, as w from the directions of Cornelius, Hess, and oth living fresco painters, from the same Report, agre material point with the advice of those earlier prac the art.

The selection of the limestone to be employed in f ing, both for the ground and for the white, is a matt importance; it should be nearly pure carbonate o should contain as few foreign materials as poss early Italian painters found Travertine the stone for the purpose; it is in great abundance in the R pagna, being a deposit or calcareous sediment from t of water which run from the Apennines, which Central Italy chiefly of a soft limestone. The foll lyses of limestones are by Mr. Richard Phillips. T of Travertine is—

Carbonate of lime	
Alumina, with a trace of oxide of iron .	

Its lime is pure white. The lime used now by t tine fresco painters is so nearly pure carbonate of li appreciable quantity of any admixture can be detec limestone used by the painters of Genoa is also good: its analysis is—

Carbonate of lime	
Carbonate of magnesia . . .	
Earthy matter, oxide of iron, bituminous matte	

This lime is of the purest white, and the Genoes notwithstanding their vicinity to the sea, are perfectl The first fresco that was executed in Genoa, ac Soprani, is still in excellent preservation: it is the tion of the Virgin, in Santa Maria di Castello, p Justus de Alemania, or Justus of Germany, in 14 lime used by the fresco painters of Munich is also it is made of the marble pebbles brought down Bavarian Alps by the Isar: the analysis of the ston

Carbonate of lime . . .	80
Carbonate of magnesia . .	20
	100

Excellent limestone for the purpose is found als land, in the neighbourhood of Bristol and in ot That of the White Quarry on Durdham Down, ne gives—

Carbonate of lime . . .	99·5
Bituminous matter . .	·3
Earthy matter . . .	·2
	100

In other specimens—

Carbonate of lime . . .	99·6	..
Bituminous matter . . .	·2	..
Oxide of iron and earthy matter .	·2	..
	100	1

The analysis of the Wick (Bath) stone is—

Carbonate of lime	97
Impurity, chiefly oxide of iron . .	3
	100

Of that of the Vogrie quarry near Edinburgh, the is—

Carbonate of lime	9
Silica, alumina, and a little oxide of iron and bituminous matter	
	10

From these examples it appears that a rich or pu used and is necessary for fresco painting, and that t several limestones fit for the purpose in this country, that of Bristol (Durdham Down) is of more than a purity, and eminently fit for the purpose.

Modern fresco painters recommend the lime to b much longer period than Cennini and other earl direct. If it is used too fresh, it blisters, and someti

to a brownish red: its caustic quality requires to
l, but not destroyed, before it is used. On this
Eastlake's Report contains several scientific obser-
n the authority of Mr. R. Phillips, of which the
the substance:—
st limestone consists, in atomic proportions, solely

Carbonic acid . . .	22
Lime	28
Carbonate of lime	50

tuted, whether in its original state or reproduced
agency, it is not at all caustic. If the limestone
l to sufficient heat, it loses the carbonic acid, and
ft—
commonly called quicklime) . . . 28
e added to this lime as much water as will com-
, and the result is a compound of—
. . . . 28
. . . . 9
te of lime (commonly called slaked lime) 37
bserved that this proportion of water in *combina-*
e lime does not (apparently) moisten it. Hy-
e is a dry powder; in the addition of more water,
ither mixes with the lime *mechanically* or dissolves
rate of lime is exposed to the air, the water is ex-
rbonic acid, and the result is, as at first, carbonate

Carbonic acid	22
Lime	28
Carbonate of lime	50

chemically speaking, the original limestone, al-
original state of cohesion is never regained. The
state of lime therefore is arrived at when, by ex-
e air or by other means, it is restored to the state
te or has regained its maximum of carbonic acid.
nd kept air-tight, it cannot acquire the carbonic
renders it non-caustic. Time therefore has no
re lime, whether slaked or unslaked, provided it
osed to the air or some other source of carbonic

these sources, though not an abundant one, is
ver water, which contains carbonic acid and car-
me (recently boiled or distilled water does not con-
, and the frequent washing recommended by all
ies on fresco-painting is a means of restoring the
te of carbonate; pure or caustic lime being con-
ied off in solution with the water that is thrown
arbonate of lime being formed. The mixture of
carbonate of lime is a mere mechanical mixture;
lime may therefore be kept in a moist state. It
e kept in a dry state without further change, but
ist or dry it would be wholly useless for the com-
mortar, and would possess no adhesive quality.
state of mildness it would resemble mere moistened
would crumble to dust. But as long as the lime
tic, as long as, in other words, it has not recovered
of carbonic acid, it will, on exposure to the air in
e, rapidly attract it, and the surface soon becomes
and in a manner petrified. This is what takes
g and after the process of fresco-painting; moisture
ys the medium—the conductor, so to speak—of
id.'
above it is evident, therefore, that the lime used
naco in fresco painting must not be entirely car-
it would not set; a certain degree of causticity is
how much, however, can be learnt probably by
y; and this is the greatest practical difficulty in
he picture must be executed while the *intonaco*
ft; no more work therefore ought to be commenced
completed within the time (a few hours) that the
ires to harden. Numerous joints are thus neces-
rge fresco, and the judicious painter will contrive
oints shall be identical with the inner outlines of
f the figures and their draperies, or any other
s to be no disfigurement to the work. To retard
of the setting or hardening of the composition of
o is a great desideratum in fresco-painting.
s recommends the following mode of preparing the
it, lined with brick, is filled with clean burnt limestones, which, on being slaked, are stirred continually until the substance is reduced to an impalpable consistence. Clean river-sand is then spread over the surface, to the depth of a foot or more, and then the whole is covered with earth so as completely to exclude the air. It is allowed to remain in this condition for at least three years: it retains its moisture for many years. It is excluded from the air, for the reasons assigned above, that it may retain its causticity, and not become entirely carbonated.

3. *Execution of the Fresco.* — Cornelius recommends three years' interval between the rough coating of the wall and the commencement of the actual preparation for painting, unless the lime used in the first instance was very old, when between six and twelve months will be sufficient. Before laying on the *intonaco* the prepared ground must be repeatedly wetted with rain-water or boiled water, until it will absorb no more; then a thin moderately rough coat of plaster of sand and lime must be laid over as much of the wet surface as can be painted in one day; as soon as this coat begins to set, in about ten minutes or so, another thin coat must be laid on with a wooden trowel, somewhat fatter, that is, with more lime and less sand, or with about equal parts of lime and fine river-sand; both layers together being scarcely a quarter of an inch thick. Upon this coat the fresco is to be painted: if the surface as left by the wooden trowel is found to be too smooth, it can be made slightly rough with a dry brush. This *intonaco* will be fit to paint upon in about a quarter of an hour: it is hard enough to receive the colour as soon as it will not yield to the pressure of the finger; if too soft, the wet brush will wash up the sand. The first process in executing the picture is to pounce or trace the outline of the allotted work, from the expressly prepared cartoon, of the same size as the fresco, upon the *intonaco* with a hard point (the artist must please himself as to the method of tracing); then the painting may be commenced in thin watery washes, from the finished coloured sketch, which must be placed so as to be conveniently seen while at work; for the process of fresco-painting should be simple copying; the mere execution requires so much attention, that it is necessary for the painter to be relieved of every other consideration. After the first wash is finished, an interval of twenty or thirty minutes should be allowed for the absorption of the water before commencing the second painting, otherwise in retouching and elaborating the design the surface would be washed up and the work destroyed. While the *intonaco* is wet, a repetition of the same tint will have the effect of a darker tint, as in water-colour drawing: the retouches for strengthening and rounding should be hatched, and, where great depth or force is required, repeated hatchings are necessary. The surface must be constantly kept moist (but not wet) while painting, or the superadded colour will not unite with what is beneath; the work is finished by glazings and washings. When the portion of the picture allotted for the day's work is completed, the superfluous portions of the *intonaco* should be carefully cut away. In the next day's operation the surface must be wetted as before, and the edging of the finished piece carefully moistened with a brush. If it should be necessary to leave the work for an hour or two, it may be kept moist by pressing a wet linen cloth against it, by means of a board padded and covered with a waxed cloth; the board may be propped against the wall by a pole from the ground.

If a piece of work should be unsatisfactorily executed, or accidentally damaged, it must be entirely cut away, and the whole operation be commenced afresh. A fresco cannot safely be retouched when dry, but if retouched the vehicle should be vinegar and the white of egg; this answers well for the shadows: the lights are sometimes heightened by crayons made of pounded egg-shells. It is useless, however, to retouch a fresco in the open air, as the rain would wash all retouches away: the fresco itself is not injured by rain.

The colours used in fresco-painting are all ground and mixed in water, boiled or distilled; they are chiefly earths; no vegetable and few mineral colours can be used with safety, but there is a mode of rendering vermilion durable. The white used is exclusively lime, which has either been well washed and long kept, or, by boiling and repeated manipulations and drying, is rendered less caustic. The following colours are used by Hess, the eminent fresco-painter at Munich:—*yellow*, all kinds of ochres, raw siena; *red*, all kinds of burnt ochres, burnt siena, oxides of iron, and lake-coloured burnt vitriol; *green*, terra-vert, or Verona green, cobalt-green, and chrome-green; *blue*, ultramarine pure and factitious, cobalt. These colours are perfectly safe; chrome-yellow and vermilion are also used, but not in every case with success. Lime destroys all animal and vegetable colours.

The tints should be carefully prepared and kept in pots, and if a great quantity of any one tint should be required in one picture, it should all be prepared at once, as it is almost impossible to match tints exactly, as they are of different degrees when wet and when dry.

The brushes are of the ordinary materials, but should be somewhat longer than those used in oil-painting. In addition to hog's-hair tools, small pencils of otter hair in quills are used: other hairs will not resist the lime, which burns and curls them. The palette, commonly made of tin, with an edge to prevent the colours from running off, should be covered with varnish, to preserve the tin from rust.

To know when to leave off is a great art in oil-painting, but in fresco it is of the utmost importance. On this subject Hess says, 'If the touches of the pencil remain wet on the surface, and are no longer sucked in instantaneously, the painter must cease to work, for henceforth the colour no longer unites with the plaster, but when dry will exhibit chalky spots. As this moment of time approaches, the absorbing power increases, the wet brush is sucked dry by mere contact with the wall, and the operation of painting becomes more difficult. It is therefore advisable to cease as soon as these indications appear.

'If the wall begins to show these symptoms too soon, for example in the second painting, some time may be gained by moistening the surface with a large brush, and trying to remove the crust or setting that has already begun to take place: but this remedy affords but a short respite.'

Fresco-painting as thus described is sometimes termed by Italians *buon-fresco*, to distinguish it from another method which they term *fresco-secco*, dry fresco.

Fresco-secco is practised at Munich as follows, as described in Mr. Wilson's report:—The plastering of the wall having been completed as for buon-fresco, the whole is allowed to dry thoroughly. Before painting, the surface of the *intonaco* must be rubbed with pumice-stone, and on the evening of the day before the painting is to be commenced, it must be thoroughly washed with water mixed with a little lime; it must be wetted again the next morning, and it is then ready for pouncing or tracing the outline, and painting; the wall must be kept constantly moist by means of a syringe. The colours used are the same as in *buon-fresco*, and the work is very durable. All fresco painters do not trace their outlines from cartoons, but it is the safest practice, and has been adopted by all the best masters. *Fresco-secco* is a good method for decorative painting.

4. *Cleaning and transferring Frescoes.*—In the opinion of Cornelius, frescoes are best cleaned with bread. The mouldy appearance which sometimes shows itself can be removed with a wet sponge, unless it arises from saltpetre in the walls, in which case there is no remedy. These injuries must be provided against in the construction of the walls: the vertical progress of damp may be intercepted by covering one of the lower courses of bricks or stones with sheet lead, which must be protected on each side by a coat of pitch; the wall may be then continued as usual. Frescoes may be safely washed with a soft sponge and water; vinegar and wine may likewise be used with safety; even frescoes that have been whitewashed over can be washed clean. The frescoes by Raphael, in the Stanze of the Vatican, of nearly two centuries of dirt, were washed with wine by Carlo Maratta.

As many valuable frescoes, if left in their original localities, must have inevitably perished, through the bad construction of the walls, unfit situations, or from other causes, the invention of some mode of removing them from their objectionable situations became an object of great interest, and several very ingenious methods of transferring frescoes from walls have been devised, and often practised with success. Mr. Ludwig Gruner removed and transferred to canvas, in 1829, at Brescia, some frescoes by Lattanzio Gambara in the convent of St. Eufemia, in the following manner:—the first process was to clean the wall perfectly; then to pass a strong glue over the surface, and by this means to fasten a sheet of fine calico upon it. The calico, being made fast by the glue to the irregularities of the wall, was itself covered with glue, and some strong linen glued over it. 'In this state heat was applied, which caused the glue, even on the fresco, to sweat through the cloths, and to incorporate the whole. After this a third layer of strong cloth was applied on a new coat of glue. The whole remained in this state two or three days (the time required may vary according to the heat of the weather). The superfluous cloth extending beyond the painting was now cut off so as to leave a sharp edge: the operation of stripping or rolling off the cloths began at the corners above and below, till at last the mere weight of the cloth and what adhered to it sufficed to detach the whole, and the wall behind appeared white, while every particle of colour remained attached to the cloth. To transfer the painting again to cloth, a stronger glue is used, which resists moisture, it being necessary to detach the cloths first used, by tepid water, after the back of the painting is fastened to its new bed.'

Some frescoes by Paul Veronese, in the Morosini villa near Castel Franco, were transferred by Count Balbi of Venice. Cloth was fastened to the wall by means of paste made of beer and flour, and riveted to the irregularities of the wall by means of a hammer composed of bristles.

Several works on this subject have recently appeared in Italy:—Leopoldo Cicognara, *Del Distacco delle Pitture a Fresco*, 1825, in 'Antologia di Firenze,' vol. xviii. num. lii.; Girolamo Baruffaldi, *Vita di Antonio Contri, Pittore e Ristauratore di Pitture dal Muro*, Venice, 1834; Cenni, *Sopra alcune Pitture staccate dal Muro e trasportate su Tela*, &c., Bologna, 1840. See the *Appendices to the Reports of the Commissioners on the Fine Arts*, 1842, 1843, which contain many details on subjects connected with fresco-painting, to which there is not space in this article even to allude.

FRESNEL, AUGUSTIN JEAN, a very distinguished French mathematician and natural philosopher, was born in 1788, at Broglie near Bernay: his father, who was an architect, endeavoured early to communicate to him the rudiments of education; but considerable difficulty was experienced in effecting this desirable object, partly from the delicate state of the pupil's health, and partly, it is supposed, from a distaste in the latter for the acquisition of that kind of knowledge which depends chiefly on the exercise of the memory; hence the youth made small progress in the study of languages, and he was eight years of age before he could write in a legible manner. An inquiring faculty was however manifest in him even at that time by the experiments which he made to determine the best materials and the best constructions for the small machines used in the sports of children.

At the age of sixteen years and a half he was admitted a pupil in the Ecole Polytechnique, where he soon made great progress in the study of the sciences, and where he attracted the notice of Legendre by his solution of a problem which had been proposed by that mathematician as a trial of the abilities of the students. On leaving that institution he was appointed engineer in the department of the Ponts et Chaussées.

It is remarkable, however, that it was not till the year 1814 that Fresnel began to study the branch of science in which he afterwards became so much distinguished: in that year he requested a friend, by letter, to inquire of his uncle what was meant by the 'polarization of light;' and it is to be presumed that he obtained the information he sought, for in eight months from that time he appears to have made himself fully acquainted with the subject. In 1823 he was made a member of the Académie des Sciences at Paris; in 1825 he was elected a Fellow of the Royal Society of London, and two years later this learned body awarded him the Rumford medal for his optical discoveries. At the time of his death, which happened in 1827, he held the post of secretary to the Commission for the Lighthouses of France, and he was succeeded in this post by his brother M. Léonor Fresnel.

The phenomena of the colours exhibited by crystallized plates when exposed to polarized light, and the rings which appear to surround their axes, were attentively examined by Fresnel, and, in conjunction with his friend Arago, he succeeded in reducing the interferences of polarized light to a few simple laws, which were duly verified by experimental analysis. This subject, which has also been investigated by Sir David Brewster, M. Biot, and subsequently by M. Mitscherlich, is treated by Fresnel in a Mémoire which was read to the Institute of France in 1816. He gave a formula for the intensity of a previously polarized ray when reflected from a surface under any angle of incidence in a plane inclined to the plane of primitive polarization; and this, with a general account of the deviations which the plane of polarization undergoes in consequence of the reflexion, is contained in two memoirs which were presented to the Académie des Sciences in 1817 and 1818.

In 1819 he gained the prize which, in the preceding year, had been proposed by the Institute for the best memoir on the diffraction of light. In his Mémoire he showed that rays passing at a sensible distance from a reflecting body de-

n their primitive direction and interfere with the
ys; and, on the principles of the undulatory theory,
ed the effect to a number of small waves which ori-
ith each portion of the surface of the primitive wave
arrives at the reflecting surface. In his 'Mémoire
ffraction de la Lumière,' 4to. Paris, Fresnel has given
te explanation, on the undulatory hypothesis, of the
fringes produced by an opaque object when exposed
nous point; he has also given a table of the several
nd minima of the intensity of light beyond the limits
metrical shadow, and he determined that, within those
e light gradually diminishes till total darkness takes
n order to examine the effects produced by the
a of light when it is made to pass through a small
he caused the image of the sun at the focus of a
s to fall precisely at the spot where a small circular
as made in a plate of metal; and, placing before his
ier glass lens, he suffered the cone of light from the
fall on the lens, when the image of the orifice ap-
s a bright spot, surrounded by rings of light of
colours. With a micrometer Fresnel measured the
s of these rings, and he has given an explanation of
tions produced in the intensity of the light of the
spot when the distance of the eye-glass from the
varied. He observed also the succession of bright
bands which are produced when light from a radiant
reflected from two plane mirrors inclined to one
at an angle nearly equal to 180 degrees.

aper entitled 'Considérations théoriques sur la Pola-
le la Lumière,' which is printed in the 'Bulletin de
é Philomathique,' 1824, Fresnel assumes that the eye
l only by those vibratory motions of the particles
which take place transversely, or in planes perpen-
the direction of the motion of the wave. Unpo-
ht he conceived to consist of a rapid succession of
which the vibrations are performed in every direc-
endicularly to that of the ray; and common polarized
onsist in the transverse vibrations being parallel to
passing through the direction of the ray. By com-
e hypothesis of transverse vibrations with the theory
tions, Fresnel obtained formulæ for the intensity of
light at any angle of incidence.

nceived that the phenomena of double refraction in
with one axis depend upon a modification of the
f the æther by the action of the molecules of the
the elasticity of the latter molecules in a direction
cular to the axis being supposed to be different from
city in a direction parallel to the axis. In the year
esnel presented to the Académie des Sciences a
in which the properties of double refraction and
on in biaxal crystals were contemplated; and he in-
l what he called the 'surface of elasticity:' a
s conceived to be such that the force of elasticity by
e vibrations of a molecule in the direction of the
such surface are regulated is proportional to the square
dius. He also gave, for doubly refracting crystals
axes, an indication of the general equation to a wave
which has since been investigated by Ampère and
gh.

l's inquiries were also directed to the subject of rota-
rization; and he found by experiments that the phe-
might be explained by conceiving the molecules of
hich give rise to the rays in the direction of the axis
artz, or of the fluids in which the like phenomena
ited, to revolve uniformly in circles, with different
, some from right to left, and others in a contrary
. The colours produced by such media he conceived
ving to the interferences of two rays or pencils in
e molecules revolve in opposite directions.

l also proved that light was circularly polarized by
l reflexions from glass at an angle equal to about
and placing a crystallized plate between two rhom-
glass, each of which polarized the light circularly,
their planes of reflexion at right angles to one an-
observed that the light transmitted through the
chibited phenomena similar to those which are seen
axis of quartz. He succeeded in exhibiting before
émie, in 1822, a division of the pencils, so that a line
double, by making the light pass through prisms of
ich were subject to strong pressure by means of
nd he was the first who observed the change produced
on the tints of sulphate of lime, a subject which has
n more completely investigated by M. Mitscherlich.

Apparently unacquainted with what had been previously proposed by Brewster for a like purpose, this philosopher and engineer devised several constructions of great lenses for lighthouses; one of these constructions consisted of five concentric spherical zones (plano-convex) of glass disposed about a central lens, the whole being contained in a square frame. Eight of these, in vertical positions, constituted an octagonal case or lantern, which revolved about a vertical axis, and had in its centre a powerful lamp. Another construction consisted of two great lanterns, as they may be called, one within the other; the convex surface of each was formed of thin cylindrical refractors, and both revolved about a lamp in their common axis: the cylinders were so disposed as to produce, by the revolution, incessant flashes of light.

Fresnel made some experiments for the purpose of decomposing water by means of a magnet; and the method which he pursued consisted in producing a current in an electro-magnetic helix enclosing a bar-magnet covered with silk: on plunging the ends of the wire in water, he obtained some remarkable effects; but, being unable to account for certain anomalies which he observed, he abandoned the project.

(Duleau, *Notice sur Fresnel*; *Biographie Universelle*, Supplement.)

FREY, JACOB, one of the most able engravers of the eighteenth century, was born at Lucern in 1681. After learning the first rudiments of engraving of a cousin, in his native place, he went to Rome, where he obtained employment from and was instructed by Westerhout, who also introduced him to the notice of Carlo Maratta, with whom Frey perfected himself as a draughtsman.

Frey made an engraving for Maratta of a drawing of Hercules and the Serpent, after Annibal Caracci, which excited that painter's admiration and astonishment. Frey had used the needle more than was customary at that time with engravers; a practice which Maratta recommended him strongly to pursue.

Frey soon obtained the reputation of the greatest engraver at Rome and of his time. He engraved in all eighty pieces, including many of the finest works of Italian art. Among the principal are St. Jerome, and Martyrdom of St. Sebastian, after Domenichino; St. Romualdo, after Sacchi; a copy of a Holy Family, by Edelinck, after Raphael; the Aurora, after Guido; and several admirable plates after Maratta, Cignani, An. Caracci, and others. The Aurora, after Guido, was one of Frey's favourite pieces; it is beautifully drawn, and the Hours have a surprising degree of buoyancy and motion; though less careful in the detail of the accessaries, Frey's is a very superior print to that made by Raphael Morghen of the same subject, especially in the extremities and general treatment of the Hours and Aurora, which are the essential portion of the composition. He died at Rome in 1752. There is a notice of him and a list of his works in J. C. Fuessli's *Geschichte der besten Künstler in der Schweitz*; there is also an account of him in Gandellini's *Notizie Istoriche degli Intagliatori*.

FRICTION WHEELS. [Wheels, P. C.]

FRISI, PAOLO, a distinguished Italian mathematician, was born at Milan, April 13, 1728, of a family which came originally from Strassburg; and at fifteen years of age he was placed in a monastery of the Barnabites, of whose order he became a member. At this time, apparently, the cultivation of the sciences formed no part of the discipline of the institution; Frisi acquired, however, some notion of geography from a number of old maps which lined the walls of the corridors, and he made considerable progress in the study of mathematics with almost no other aid than that of a few books of which he obtained possession.

From Milan he was sent to the university of Pavia, where he studied theology; and at intervals of leisure he greatly extended his knowledge of mathematics. He was afterwards appointed to give instruction in philosophy at Lodi; and while at this place he composed a treatise entitled 'Disquisitio Mathematica in Caussam Physicam Figurae et Magnitudinis Telluris nostrae,' which his friend Donato Silva, at his own expense, caused to be published at Milan in 1751. In this work proof is given, agreeably to the Newtonian system, that the earth has the form of an oblate spheroid; and its merit procured for the author an invitation from the king of Sardinia to deliver lectures in philosophy at Casal. Frisi accepted the invitation; but the Académie des Sciences of Paris having, in 1753, nominated him one of its foreign correspondents, the honour thus conferred upon him seems to have induced the principals of his order, at Milan, to give him the appointment of professor of philosophy in the college of St. Alexander in that city. His dissertation on the figure of the earth was about that time criticised by an ill-informed person, a Jesuit, who asserted that the arguments were inconclusive, and who reproached the author with attempting to obscure the glory of Italian science by the adoption of English ideas. Such an adversary was easily silenced; but the attack produced in the mind of Frisi a rooted dislike to the Jesuits in general. In answer to the objections made to some of the propositions he wrote a work called 'Estratto del Capo Quarto del Quinto Volume della Storia Literaria d'Italia,' &c., which was published at Milan in 1755.

In the same year he published at Lugano a tract entitled 'Saggio della Morale Filosofia,' &c.; and, at Milan, his work 'De Existentia et Motu Ætheris, seu de Theoria Electricitatis,' &c. About the same time he took occasion to oppose in public the belief in witchcraft and magic, which then existed in Italy; and this boldness, together with a certain freedom in his manner of living, appears to have raised up against him many enemies: fearing their machinations, he wished to withdraw from Milan, and he gladly accepted an appointment in the university of Pisa, which was conferred upon him in 1756 by the grand-duke Leopold. While holding this post he published, in Latin (Lucca, 1757), select dissertations on the subject of electricity, which two years before had been written by Euler, Resaud, and himself for the prize proposed by the Academy of Sciences at St. Petersburg; and a tract entitled 'De Motu Diurno Terræ' (Pisa, 1758), which had obtained the prize proposed by the Royal Academy of Berlin. He also published 'Dissertationes Variæ' in two volumes; of which the first (Lucca, 1760) contains a tract entitled 'De Atmosphærâ Cœlestium Corporum,' and the second (Lucca, 1761) two others, entitled 'De Inæqualitatibus Motus Planetarum omnium in Orbitis Circularibus atque Ellipticis' (in two books), and 'De Methodo Fluxionum Geometricarum.'

In 1760 Frisi made a journey to Rome and Naples in consequence of a commission which he received from the pope, Clement XIII., to examine and report upon a subject in dispute between the people of Ferrara and Bologna respecting the navigation of certain rivers: he also assisted with his advice the commissioners appointed by the Venetians to repair the damages caused by the overflowing of the Brenta; and for these services, though he appears to have excited the jealousy of the engineers of the country, and to have made enemies of many persons whose estates were affected by the measures which were taken in consequence of his reports, he was liberally remunerated both by the Pope and the Venetians. In 1761 he published, at Lucca, a tract entitled 'Piano de' Lavori da farsi per liberare e assicurare dalle Acque le Provincie di Bologna, di Ferrara, di Ravenna,' &c.; and, in the following year, one in three books, entitled 'Del Modo di regolare i Fiumi e Torrenti principalmente del Bolognese e della Romagna.' Of this there have been four editions. He returned to Milan in 1764, having been appointed professor of mathematics in that city, and, except occasional absences, he continued to reside there till his death. In the year 1766 he made a visit to France, and from thence he came to London, where, as well as in Paris, he received great attentions from the learned: the Portuguese ambassador in the latter city proposed to him an appointment in Lisbon, but this he declined, being unwilling entirely to leave his country. Two years afterwards he went to Vienna, where also he was well received, and where he was consulted on the subject of the disputes between the pope and the emperor.

Soon after his return, the pope (Pius VI.) gave him a dispensation from his monastic engagements, and he lived subsequently as a secular priest. In 1778 he made a journey to Switzerland, where he conceived the idea of writing a tract on subterranean rivers; and this, with dissertations on the meteorological influence of the moon, on conductors of electricity, and on the heat of the earth, he published at Milan, in 1781, under the title of 'Opuscoli Filosofici.'

In the year 1776, having previously enjoyed excellent health, he first felt the symptoms of a painful disease; these gradually increased in violence, and eight years afterwards, in the hope of obtaining relief, he underwent an operation: a mortification however ensued, and terminated his life at Milan, November 22, 1784, in his sixty-seventh year. He was buried in the church of St. Alexander in that city, and the Barnabites honoured his tomb with an epitaph in Latin.

In 1757 Frisi was elected a Fellow of the Royal Society of London: he was also a member of the A
Sciences of St. Petersburg, of the Academies
Stockholm, Copenhagen, and Berne, and of the
Bologna. He received a golden medal in 175
archduke Joseph, afterwards emperor; and th
Maria Theresa granted him a pension for life.

Besides the works which have been mentioned
lished many others; and of these the following
cipal:—'Prælectio habita Mediolani' viii. idus M
'Saggio sopra l'Architettura Gotica' (Leghorn,
Gravitate Universali libri tres' (Milan, 17
much praised by D'Alembert and John Bern
Maniera di preservare gli Edifizi dal Fulmine' (Mi
'Danielis Melandri et Pauli Frisii alterius ad
Theoria Lunæ Commentarii' (Parma, 1769); 'Co
Physicæ et Mathematicæ,' 2 tom. 4to. (Milan, 17
—this is considered his principal work; 'Del'
tura, Statica, e Idraulica' (Milan, 1777); 'P
Operum:' tom. 1, Algebram et Geometriam A
continens (Milan, 1782); tom. 2, Mechanicam
sam et Mechanicæ Applicationem ad Aquarum
Theoriam (Ibid. 1783). The third volume, which
Cosmography, was published by two of his brothe
death. He published, at various times, notices o
of Galileo Galilei and Bonaventura Cavalieri, of
Newton, Donato Silva, and Titus Pomponius A
wrote a notice of the empress Maria Theresa, which
lished at Pisa in 1783, without his name; a
D'Alembert, which was published after his death.
left several works in manuscript.

(*Biographie Universelle.*)

FRITILLA'RIA, a genus belonging to the na
Liliaceæ. It has a perianth of 6 leaves with a ne
depression at the base of each; the style trifid at
the seeds flat. Of this genus the common Fritilla
leagris, is a native of Great Britain. It has a singl
leafy stem, the leaves all alternate and linear-lance
inhabits meadows and pastures, and is found thro
rope. It has flesh-coloured flowers, with numerou
sometimes white spots. *F. montana* grows in the m
districts of Europe. It has the two floral leaves, op
distinct from those of the stem. *F. pyrænaica* of S
F. tulipifolia of Bieberstein, is found in Greece. T
are often cultivated in gardens on account of the
They blossom in April and May, and will grow in
mon garden soil.

(Babington, *Manual of British Botany*; Ko
Germanica.)

FUCHSIA, a genus of plants belonging to t
order Onagraceæ. This genus was named afte
Fuchs, one of the earliest of modern cultivators
He was born at Wembdingen in Swabia, in 1501
kept a school, but was made a professor at Ingolsta
from whence he removed to Anspach, and subse
Tübingen, where he died in 1556. He wrote a
on botany, with the title 'De Stirpium Historia C
Insignes,' which was published in folio at Basle
This work was illustrated with wood-cuts executed
lin of Strassburg. These engravings are admir
and some of them would bear comparison with
engravings of the present day. This work has been
into almost every European language, and many
the original Latin have been published. It was
only a part of a great work which the author ha
and when he died, he left about 1500 drawings,
he had intended to illustrate a second and third pa

The genus Fuchsia has the tube of the calyx
the ovarium at the base, and drawn out at the a
cylindrical 4-cleft tube, whose lobes soon fall of
alternating with the lobes of the calyx, and inse
upper part of the tube, very rarely wanting; 8 sta
ovary crowned by an urceolate gland; the sty
crowned by a capitate stigma; the berry oblon
globose, 4-valved, 4-celled, many-seeded. The
shrubs, usually with opposite leaves, and axillary
pedicels, which are sometimes disposed in racemes
of the branches. The flowers, which are very
usually drooping, of a red colour, rarely white, s
cleft, and decandrous. There are few genera
which, under cultivation, there is a greater tend
the flowers to sport; and thus they frequently affo
interesting and important illustrations of the doctr
phology.

microphylla, Small-leaved Fuchsia, has pubescent es, with opposite, small, elliptic-oblong, acutish, d, glabrous, a little ciliated leaves; the pedicels y, shorter than the flowers; the calyx funnel-shaped, ovate acuminated lobes; retuse toothed petals. This is a native of the volcanic mountain Jorullo in Mexico. s a scarlet calyx, with deep-red petals, and blossoms une to September. It was first described by Hum- Bonpland, and Kunth, in their work on American and was first introduced into England in 1828. It is e of the most commonly cultivated of the species in dens of Great Britain.

occinea, Scarlet Fuchsia, has glabrous branches, leaves, or 3 in a whorl, ovate, acute, denticulated, t petioles; the pedicels axillary, drooping, longer wers; the lobes of the calyx oblong, acute, exceeding ls, which are obovate and convolute. It is a native in marshy districts, and is found as far south as the f Magalhaens. It is one of the species earliest intro- nto the gardens of Great Britain; and was first de- by Aiton in the 'Hortus Kewensis.' It has a scarlet with violaceous petals. In its native countries the s used for obtaining a black colouring-matter, and the nd young branches are used as medicine. It grows ssoms in the open air in the summer, but requires ion in the winter.

corymbiflora (*corymbifera*, Walpers), Corymbose a, has branches somewhat tetragonal; leaves opposite, e, oblong-lanceolate, almost entire; the pedicels 3, terminal, nodding, shorter than the flowers; the lobes calyx lanceolate-acute, twice the length of the petals, are oblong-lanceolate. This elegant shrub is about 6 height, and is a native of Peru about Chincao and in shady groves. It has scarlet flowers two inches which hang down in beautiful corymbs. The berries te-oblong, of a reddish purple color. This plant, h described by Ruiz and Pavon, has only been recently ed into our gardens, and is now justly considered the namental species of this beautiful genus.

borescens, Arborescent Fuchsia, has glabrous branches, es 3 in a whorl, oval-oblong, acuminated at both tiolate, quite entire; the panicle terminal, trichoto- early naked; the calyx funnel-shaped, with the lobes cute, and spreadingly reflexed, also the petals. It is of Mexico, and has been introduced into this country 24. It is a larger plant than most of the species, not ntly attaining a height of 15 feet.

racilis, Slender Fuchsia, has the branches finely nt; the leaves opposite, glabrous, on long petioles y denticulated; the pedicels axillary, nodding, as the calyx; the lobes of the calyx oblong-acute, ex- the petals, which are convolute and retuse; the undivided. This plant was first described by , and has been grown in this country since 1823. wers have a scarlet calyx and purple petals.

t fifty species of Fuchsia have been described, and more than those named above have been introduced e gardens of Europe. They are all American They thrive well in a rich light soil; and young of them strike root readily in the same kind of soil overed over with a hand-glass. Many will grow in en air in this country throughout the winter with a ght protection. When planted in clumps on lawns or they should be mulched at the root to preserve them the winter. In the spring, when the ground is , the stems of the preceding year, which are generally hould be cut off quite close to the ground, to allow the shoots to spring from the root.

n, *Gardener's Dictionary*, vol. ii.; Walpers, *Reper- Botanices systematicæ*, vol. ii.; Bischoff, *Lehrbuch tanik.*)

OI'DES, the vague title for many fossil marine given by Brongniart. They are mostly referred to enera by later writers. There is a peculiar geological in the distribution of Fucoids, since Dr. Forchhammer *ts to the British Association*, 1844) has shown the lity of their influence in the metamorphism of rocks.

NTE RABIA (antiently *Ocasro;* in Biscayan, *e-Ibaya*, *i. e.* the Frontier River; in English, *Font-* is a strong town in Spain, in the province of Gui- and is one of the keys of the kingdom. It is situated 21′ N. lat. and 1° 47′ W. long., on a small pen- n the left bank of the river Bidassoa, which forms the frontier between Spain and France, and falls into the Bay of Biscay between Fuente Rabia and Andayes. It is built on a small hill facing the sea; on the land side it is covered by a lofty mountain, and on the sea side it has a fort. It is, however, a place of small importance, with only 2100 inhabitants, and the harbour will admit only barques of forty or fifty tons burden. At the mouth of the Bidassoa is the Pheasants' Island, or Isle of Conferences, remarkable for the negotiations which led to the conclusion of the treaty of the Pyrenees in 1659. There is a ferry over the Bidassoa to Andayes, and, according to a convention, Spain levies the fare on passengers from France, and France on passengers coming from Spain, the Bidassoa being considered as a neutral river.

(Stein, *Geogr. Lexicon;* Hassel, *Handbuch*, vol. ix.; Cannabich, *Lehrbuch.*)

FUERTEVENTURA, one of the Canary Islands, lies between 28° 3′ and 28° 46′ N. lat. and between 13° 50′ and 14° 30′ W. long., and nearer the African continent than any island of the group, the harbour of Puerto de Cabras being only sixty miles from Capo Juby. The island is about fifty-two miles in length from north-north-east to south-south-west, with an average width of fifteen miles. This gives an area of more than 780 square miles, but, according to Mac Gregor, it contains 980 square miles, which is the extent of Warwickshire.

Fuerteventura consists of two regions, the main body and the Peninsula of Handia, which runs out from the most southern part of the main body to the west, and is united to it by a narrow sandy isthmus, about five miles in length and two and a half in breadth. The main body has a different aspect in its northern and southern districts. The northern half of the island has in general rather low and rocky shores, and the surface is covered with numerous hills of a form approaching more or less to that of a cone, which are probably of volcanic origin. Between them are numerous depressions and some valleys, among which that of Oliva is distinguished by its extent and fertility. It is about fifteen miles long and generally from two to three wide. To the north of it is Mount Atalaya, rising 1705 feet above the sea-level, in which two streams of pure water—the only streams of this description in the main body of the island—rise, which descend to the valley, and are husbanded with such care that they irrigate the whole of it. The hills south of the Vale of Oliva rise to a greater elevation; Mount Mudo, near the eastern shores, is 2160 feet above the sea-level. The hills that surround Santa Maria de Betancuria are much less elevated. Agriculture is almost entirely limited to this northern half of the island. The southern districts constitute a table-land, from 600 to 800 feet above the sea, surrounded by ridges of hills, which in most parts approach close to the sea and constitute elevated rocky shores. A great portion of these hills along the eastern coast are covered with a thick layer of lava. Those along the western coast rise to a greater elevation. Mount Chilegua is 2160 feet above the sea-level. The table-land is an extensive arid plain, over which several small villages are scattered, and from the summit of the hills the course of some brackish streams may be traced by the verdure which they cause. This part of the island is almost exclusively used as pasture ground for goats and camels. The Peninsula of Handia is composed of an isolated mountain mass, which, on the north-west, where it presents a precipitous face, rises to 2820 feet above the sea-level; but in other parts it is furrowed by narrow valleys. Though it is stated that it contains several sources of drinkable water, and has a good soil, it is uninhabited, and affords only pasture to the numerous herds which are sent to it from the main body of the island. Wild goats are very numerous here; and the largest part of the orchilla exported from Fuerteventura is collected on this peninsula.

The air of Fuerteventura is very dry, and the rains in general scanty. Sometimes not a drop falls for three years, which was the case from 1768 to 1771. This is attributed to the vicinity of the Sahara or Great Desert, from which the south-east wind, called El Levante, blows, and not only produces the most disagreeable feelings, but interrupts the occupations of the husbandman. Happily it rarely continues to blow longer than three or four days: sometimes it brings locusts to the island. The wind precipitates immense heaps of them into the sea, and they are then by the wind and waves carried to Fuerteventura and Lanzarote. Though the greater number of them perish in the passage, still those that come alive to the shores are numerous enough to lay waste all the fields and devour every blade of grass, ar are rare. Wild bees are numerous, and honey constitutes an article of export; but the attempts to introduce domestic bees have not succeeded.

The population amounted in 1831, according to a statement of Mac Gregor, to 13,500 individuals; but later accounts increase it to 18,000. If the area given by Mac Gregor is not exaggerated, not quite twenty persons are found on a square mile. They are very differently distributed over the surface of the island, five-sixths being found in the northern agricultural districts, and only one-sixth in the pastoral parts of the island. They are the descendants of the Spaniards who settled here in the beginning of the fifteenth century, but their complexion is much darker, and it is apparent that a mixture with the inhabitants of the Sahara has taken place. They are a robust race of men, fit for hard work, and patient, but they are lazy and improvident.

The capital of the island is Santa Maria de Betancuria, a small town with about 100 houses and 600 inhabitants. The largest place is Oliva, situated in the vale of that name, with more than 2000 inhabitants. Antigua, which lies in a fertile plain, is nearly as large.

Fuerteventura was conquered in 1405 by John de Bethencourt, a nobleman from Normandy, who however took it as a fief from King Henry III. of Castile and Leon. It is now the private property of the Marquis of Velamazan. During the fifteenth, sixteenth, and seventeenth centuries the island was frequently laid waste by the inhabitants of Marocco, and to these circumstances the bad state is ascribed in which the island remained up to the middle of the last century, when the cultivation of the barilla plant was introduced, which is now grown to a great extent, and constitutes the principal commercial wealth of the country. As late as 1802 all the produce of the island (barilla, orchilla, goats, skins, corn, camels, and honey) was exported to Lanzarote, and thence to other places. Since that year English vessels, sometimes as many as twenty in one year, have arrived from London and Liverpool at Puerto de Cabras, the only tolerable harbour of the island, where the anchorage is but indifferent, and the landing-place, which is a beach of shingles, still worse. The place itself contains about 1000 inhabitants.

(Glas's *History and Conquest of the Canary Islands;* Von Buch, *Physikalische Beschreibung der Canarischen Inseln; die Canarischen Inseln nach ihrem gegenwärtigen Zustande von Mac Gregor;* and Lieut. Arlett's *Survey of some of the Canary Islands*, &c., in 'London Geogr. Journal,' vol. vi.)

FÜGER, FRIEDRICH HEINRICH, a distinguished German painter, was born at Heilbron in Würtemberg, in 1751. He studied first in the academy at Dresden, whence he

her discovery. Strange to say, however, many
altogether the luminosity of the Lantern-fly,
strongly assert it. It is probably a sexual
only exhibited at certain periods in the animal

FULLER, REV. ANDREW, was bor
1754, at the village of Wicken, in Cambrid
ceived his very limited education chiefly at
his father, who was a small farmer, of dissen
removed while he was yet young. He was
and during his youth assisted his father in hi
tives having no intention to train him for any
in society. In 1770 he became a member
church at Soham, where, in the absence of a
he began to preach occasionally at a very earl
1775, his ministrations having proved very ac
regularly ordained pastor of the church of w
some time taken the charge at the request
members; and in 1782 he accepted an invitati
a Baptist church at Kettering, in Northam
which he presided until his death on the 7th
in his sixty-second year. Fuller took an ac
formation, in 1792, of the Baptist Missionary S
he was secretary until his death; and he trave
in England, Scotland, and Ireland to preach i
institution, the interests of which he promote
zeal in the face of much ignorant and prejud
His theological works are numerous and highl
many of them are small, and relate to contro
often of temporary interest. His first appeara
in 1784, when he published a valuable sermon
and Importance of Walking by Faith,' shortl
printed a treatise, which was written in 178
Gospel worthy of all acceptation; or the duty
believe in Jesus Christ,' a work which, from
dency to Arminianism, involved him in a w
with the ultra or hyper-Calvinists. This wo
several of his other more important writings
printed, and one of the replies to it, entitle
Disciples of Immanuel,' by the Rev. John St
published in 1803 and 1804, was reprinted in
important controversy was raised by the publi
of the first edition of his 'Calvinistic and S
examined and compared, as to their moral tend
Socinian views promulgated in this work we
Dr. Joshua Toulmin and Mr. Kentish, to wh
in 1797 in his 'Socinianism Indefensible, on t
moral tendency.' Toulmin's reply to the first
entitled 'The Practical Efficacy of the Uni

Dialogues, Letters, and Essays on various subjects,' volume of 'Sermons on various subjects,' 1814; and itory Discourses on the Apocalypse,' 1815, the latter repared for publication just before, but not issued till death. It is considered one of the least valuable of s. Fuller also edited several works by other writers, which was 'A View of all Religions,' by Hannah an American writer, to which he prefixed an original on Truth.'

moir of Fuller appeared in 1816, in an octavo volume, d by John Ryland, D.D., chiefly from his own papers, ntains large extracts from his diary and correspond- d a copious account of his writings, including his s contributions to religious periodicals, in which he der various signatures; and another memoir of his writings appeared in the same year from the pen of orris, of which a revised and extended edition was d in 1826, accompanied by a supplementary volume Miscellaneous Pieces on various religious subjects,' lected from his magazine papers.

s works have been repeatedly reprinted in America as in this country, and the college of New Jersey, year 1798, conferred upon him the degree of D.D., owever, he declined to use. His 'Complete Works' ntly (1845) been collected and published in one very er-royal octavo volume, with a new memoir by his drew Gunton Fuller; and from the advertisement to me it appears that a 'first collected edition' was pub- 1831, in several volumes, of which this is a reprint. s of Fuller accompany both these editions and the s of Ryland and Morris.

A'RIA (from the Latin 'fumus,' smoke, in allusion unpleasant smell which it exhales: the French, with meaning, call it *fumeterre*, and hence our English mitory), a genus of plants the type of the natural umariaceæ. It has 4 petals, the upper one spurred at 2 sepals, diadelphous stamens, fruit indehiscent and . There are about twelve species of Fumaria, smooth slender herbs, with small racemose white h flowers.

preolata, Rampant Fumitory, has ovate acute sepals, , as broad as the corolla, and half its length; globose ate fruit; bracts about a third shorter than the fruit- It is a climbing plant, and has cream-coloured flowers with red or purple.

ficinalis, Common Fumitory, has ovate lanceolate narrower and two-thirds shorter than the corolla, broader e pedicel; fruit globose truncate, slightly emarginate; two or three times shorter than the fruit-stalks. It grows -fields and cultivated land throughout the world, and tiful in Britain. The flowers are of a pale red colour, d at the summit, with a green keel to the upper and petals. The leaves are succulent, saline, and bitter, expressed juice is recommended as a remedy in cases ochondriasis and cachectic states of the body. It is said rect acidity and strengthen the stomach. Boerhaave prescribe it in black jaundice and bilious affections. also gained some reputation as a cosmetic. Dr. Cullen mends an infusion of the leaves in cutaneous disorders, also advises the use of it as a tonic whenever bitter es are desirable.

micrantha is distinguished by its sepals being orbicular , broader than and nearly half as long as the corolla; lobose, slightly pointed; bracts longer than the fruit- This species is found both in England and Scotland, pale purple flowers in dense spikes.

parviflora has ovate sepals as broad as the corolla and two-thirds shorter. It greatly resembles *F. officinalis*, maller in all its parts. The flowers are of a pale red It is found in Kent, and is also very common in the dies, where it is used as a medicine. The leaves bitter taste, and Dr. Whitlaw Ainslie mentions it in ateria Medica of Hindostan.' The Mohammedans it as a diuretic, and in maniacal cases.

aillantii has its sepals narrower than the pedicels and imes shorter than the corolla. Globose fruit, scarcely ; bracts about as long as the pedicels. The flowers are white with a purple tip. This is a British species, also found in sandy fields in the neighbourhood of nd Montpelier.

h the exception of one or two species, this genus seems worth cultivation, having but a weedy and insignificant ance. Such, however, as have a climbing tendency, look well if sown under a hedge and allowed to twine amongst the stems and branches.

(Don, *Gardener's Dict.*; Babington, *Man. Brit. Bot.*)

FUMITORY. [FUMARIA, P. C. S.]

FUNA'RIA, a genus of plants belonging to the natural order Musci, or Mosses. It has terminal fruit-stalks, with an oblique double peristome, both the outer and the inner having each 16 teeth, the inner ones opposite to those of the outer. There are three British species of this moss: *F. hygrometrica*, *F. muhlenbergii*, and *F. hibernica*.

F. hygrometrica has the leaves very concave, ovate, apiculate, entire, the nerves excurrent; the fruit-stalk curved flexuose. It is a native of Great Britain, and is found by waysides and under hedges, especially on spots where a wood-fire has been burning on the ground. It may be thus constantly found on the site of gipsies' encampments. It has obtained its specific name *hygrometrica* from its fruit-stalk having the property of twisting in different directions when moisture is applied to it. On taking a dry fruit-stalk into the hand and moistening the lower part with the finger, the capsule will turn itself from the right to the left by making two, three, or more turns; on moistening the upper part in the same manner, the capsule turns itself more rapidly in an opposite direction. Under the microscope the stalk exhibits an elongated cellular tissue twisted in a spiral form. The cellular tissue is not, however, turned uniformly, but at two-thirds of the length of the stalk it commences to assume a straighter form, and at the upper part it again turns itself, but more acutely, in an opposite direction to that of the lower part. The cause of the turning in two different directions depends on this structure of the cellular tissue. The capsule turns itself in an opposite direction to the spires which are moistened, and the circumstance of its turning more rapidly on the upper end being wetted, depends on the more acute angle made by the upper spires. The dryness of the fibres is not the cause of this phenomenon, as the green fruit-stalks, although perfectly dried, do not turn when moistened. The movements in this case are probably owing to the shortening of the vegetable fibre by the contact of moisture. In the green stalk the thick fluid contents of the cells leave a precipitate when they are dried, which fills them up and prevents the action of moisture upon them. In the ripened stalk this precipitate is dissolved and absorbed, and otherwise applied; and thus the cells, being empty, act like hollow tubes.

(Lankester, 'On the Structure of Funaria hygrometrica;' *Ann. of Nat. Hist.*, vol. iv.; Link, *Report on the Progress of Botany*, 1841, translated for the Ray Society, vol. i.; Hooker and Taylor, *Muscologia Britannica.*)

FUNCTION, ARBITRARY. In the integration of partial differential equations, arbitrary functions are introduced, that is, functions which may be of any form whatsoever. Thus, in the problem of the vibrations of a thin column of air, which leads to an equation of the form

$$\frac{d^2z}{dx^2} = a^2 \frac{d^2z}{dy^2}$$

the complete solution of the equation is

$$z = \phi\,(y + ax) + \psi\,(y - ax)$$

when ϕ and ψ stand for any functions whatever. The determination of these arbitrary functions must depend upon the data of the problem. Thus, if it were required so to determine ϕ and ψ as that z should become x when y is x, and x^2 when y is bx: we have then to determine the forms of ϕ and ψ from the two equations

$$\phi\,(x + ax) + \psi\,(x - ax) = x$$

$$\phi\,(bx + ax) + \psi\,(bx - ax) = x^2$$

These two functional equations might be solved without much difficulty, and forms of ϕx and ψx found. Theoretically, the determination of the arbitrary functions, so as to satisfy given conditions, resolves itself into the solution of functional equations.

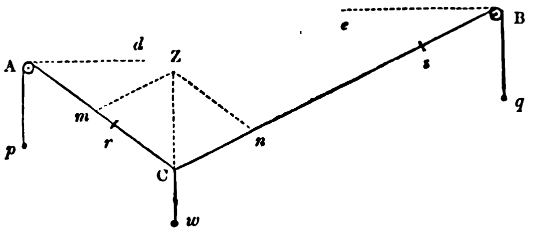
But when these questions were first considered, it was soon seen that the problems from which they are derived present very peculiar circumstances. For instance, when the problem is that of finding the manner in which a disturbance travels along a thin column of air, the preceding equation exists, when z represents the amount of compression or rarefaction which exists in the air at a distance y from a fixed origin at the end of the time x from the beginning of the motion. Now, in practice, there is no disturbance of the state of the air at the beginning of the motion, except in one small part of the column (as in a sound excited at one end of a cylindrical tube). Suppose, for example, that by introduction of external air, a certain amount of compression, c, is generated at the first moment ($x=0$) throughout the portion of the tube which extends from $y=0$ to $y=m$. When $x=0$, z is $\phi y + \psi y$, and the conditions of the problem require that $\phi y + \psi y$ should be equal to c when y lies between 0 and m, and always equal to nothing when y is greater than m. Hence, $\phi y + \psi y$ must be a discontinuous function; so that in this simple problem mathematical methods are insufficient to express a solution, unless discontinuous functions can be admitted among the solutions of partial differential equations.

There was, at one time, a spirited discussion between Euler, D'Alembert, and Lagrange, as to whether discontinuous functions could properly be admitted among the solutions of differential equations. We cannot enter into the details of this discussion, but we shall state the manner in which the question has been settled.

The considerations in Curve, P. C. S., give some approach to the notion that curves which are perfectly independent may be combined in one equation; and also that a continuous curve may be drawn, the arc of which runs as near as we please to two distinct branches of two independent curves. The power of expression given by means of definite integrals and periodic series [Integrals, Definite, P. C. S.] puts this result in a stronger light. Suppose, for example, that an axis of x being taken, we want to express mathematically the ordinate y, in such manner that it shall be nothing from $x=-\infty$ to $x=0$; that of a certain straight line from $x=0$ to $x=a$; that of a certain circle from $x=a$ to $x=b$, and nothing again from $x=b$ to $x=\infty$. In other words, we ask whether a line which is both limited and discontinuous, being a part of a straight line and a part of a circle, can be put upon the same sort of footing as an algebraic curve; so that a definite equation $y=\phi x$ shall always give $y=0$ when there is no ordinate, and shall give the proper value of y whenever there is an ordinate. The answer to this is, that such an expression for ϕx can be given, when the notation of the integral calculus is assumed. And more than this, a *continuous* curve can be found which fulfils all the conditions above noted, as nearly as we please. That is, m being a small quantity which we may name as small as we please, it is possible to find a continuous curve, the ordinate of which shall never be so great as m from $x=-\infty$ to $x=0$, shall never differ by so much as m from the ordinate of the straight line while x passes from 0 to a, nor from that of the circle while x passes from a to b, and finally, shall never be so great as m from $x=b$ to $x=\infty$. Having the power of making m as small as we please, we thus trace the expression, as it were, into its final discontinuous form when $m=0$.

In this manner, it appears that every discontinuous function may be regarded as the limiting form of a continuous one; and the various modes in which this is established take away all idea of danger from admitting discontinuous functions among the solution of differential equations. This subject is well studied in its application to physics.

FUNICULAR MACHINE is a name given by some mechanicians to a cord or chain attached at one extremity to an immoveable point, the other end passing over a fixed pulley or friction wheel and having a weight suspended from it; a weight being also suspended from the cord or chain in some part of its length between the fixed extremity and the pulley. The cord or chain becomes thus a mechanical agent, since unequal weights, applied as has been said, may be in equilibrio.



Let ACB in a vertical plane be the position of a cord suspended between two points A and B, but capable of moving freely on a pulley at each of those points, and let w be a given weight suspended from any point C; the weights p and q, which should be applied to the cord, at the extremities vertically below A and B, in order to produce equilibrium, may be thus determined. Through C draw the vertical line CZ to represent the weight w, and draw Zm, Z BC, AC, respectively: then, by mechanics, the Cn will respectively represent the strains in th AC, BC, and consequently the weights p and the case of equilibrium, must be equivalent to Now since the angles ACZ, BCZ are known, them by a and b, the sine of the angle CmZ by sin. $(a+b)$; and by trigonometry,

$$p=w\,\frac{\text{sin. }b}{\text{sin. }a+b},\ q=w\,\frac{\text{sin. }a}{\text{sin. }a+b}:$$

therefore if the cord were attached to a fixed end, as A or B, while capable of moving on a other, and a weight w were applied at any length, a weight q or p, found as above, would equilibrio.

Again, let the weights p, q, w, and the po pullies at A and B be given, the cord moving pullies and the weight w being capable of slidi of a ring along the cord; then the positions of BC of the cord, when the system is in equili found in the following manner. Imagine mn to lelogram of forces; then since CZ, Cm, Zm sented respectively by the known quantities values of the angles ACZ and CZm or BCZ by trigonometry. With these, by a geometrica or otherwise, the required positions may be mined, since AC and BC make with horizontal Be passing through A and B angles equal to the of ACZ, BCZ.

A cord suspended in a vertical plane betw points and acted on by weights placed at diffe its length, is called a funicular polygon; and th suspended cord being given, with the weight to one angular point as C, the weights at all the points, in the case of equilibrium, may be fou A and B be angular points on the left and ri having determined the strains represented by parallelogram of forces at C, construct a paral and another at B, having vertical lines passing B for the directions of their diagonals, and ha of each coincident in direction with the adjacen funicular polygon, also making the sides (Ar a and BC equal to Cm and Cn respectively: th nals will represent the weights to be suspende in order to counteract the strains in AC and B the weight w at C. By forming parallelogra manner at the other angular points, the whole in equilibrio. See 'Hutton's Tracts' (Tract 1. i). In like manner may the equilibrium of t curb-roof be determined. [Roof, P. C. page

FURNISHED LODGINGS. [Lodgings

FURRIERY, FUR DRESSING. The Hudson's Bay Company and of the North Ame is briefly given in Furs and Fur-Trade, further history of the company is given un P. C. S. The various kinds of furs mentione of those two articles, as well as some found in ou may be classed according to their use as *fe* *dressed furs.*

Felted furs. These include all such as are hat-making; and are principally the skins of rabbit, the beaver, and the neutria. If the ski the animal in winter when the fur is full, soft, called 'seasoned,' and obtains the highest pri off at any other period of the year, it is compa coarse, hairy, and less valuable, and obtains 'unseasoned skin.'

In the preparation of *hares' fur* for the ha after being opened and spread out flat, is rubbe of saw called a *rake*, for the purpose of clearing and dried blood without detaching any of the fi done, the skin is damped on the *pelt* or in several are pressed one on another to remov irregularities. Next ensues the separation of th ing from the felt beneath. This covering is an external coat of long hairs which possess r perties, and an internal coat of fine or true fu removed separately. A pair of shears, someth used in shearing sheep, are worked all over the skin so as to cut off the coarse hair without dam fur beneath; and to effect this properly is a diffic The skin before this shearing was of a browni the external hair is removed the fur beneath appears as tiful black jet. To remove this fur is the next stage. in, extended smooth and even, is placed upon a square -board made of willow, wetted occasionally to avoid the edge of the knife employed in the cutting. This about six inches long by three broad, and has a rough t is shaped something like a cheese-cutter, so as to be e backwards and forwards. With such a knife the fur radually in every part of the pelt; the knife follows ction which the fur naturally takes on the animal's at is, from the head towards the tail. The whole of rom one skin is either collected together as a light ass, or is separated into parcels according to the qualities of the different parts.

preparation of *rabbits' fur* for the hatter is somewhat from the above in its earlier stages, on account of the greasiness of the pelt, or inner surface of the skin. se of a knife in a peculiar way, the thin cuticle on e grease or fat is deposited is stripped off, bringing urities away with it. The surface beneath is then with whiting. The rabbit skin, like that of the hare, kinds of hair or fur; but the coarser, instead of being d by shearing, requires to be *pulled;* this is done by a ife about three inches long, held against a leathern orn over the thumb: the hairs are grasped, a few at a etween the knife and the thumb, and pulled out. A care is here requisite: to avoid cutting the hair instead ing it, and to avoid pulling or cutting the fine fur h. When this is done, the fine fur is cut off in the same r as hare's fur.

the *neutria skins* (the commercial name of the skin ed from the Coypou [Coypou, P. C.]), the processes are the same. The skin has derived its name (variously , *neutria*, *nutria*, *neutra*, *nuetra*) from the Spanish or an otter, to whose skin it bears some resemblance. ll of fat and grease, and requires a thorough washing ap and boiling water before being 'pulled.' The outer e hairs are treated like those of the rabbit, and not ose of the hare; being stronger, too, they require a knife and a stronger pull for their extraction. Not only lt side, but also the fur-side is full of grease, and need ough purification before the removal of the hairs and When the external hair has been pulled, the inner fur in the same way as the others.

skin of the *beaver* is, in many respects, the most service- them all for the hatter's purpose. It is, however, so full se that the pelt requires to be scoured with fullers' earth hiting before it attains a sufficient state of cleanness. oarse hairs are pulled out by the knife and thumb, and of no use to the hatter, they are sold as a stuffing for ns. Then comes the cutting or cropping, which is, at esent day and in the largest establishments, effected by beautiful machine. There is a long broad and sharp equalling in length the full width of the beaver-skin, and sted as to fall rapidly with a chopping action against the edge of another blade beneath. The skin is between the two, and is attached to a piece of me- n by which it is drawn gradually from end to end n them; as it passes, the sharp blade crops the fur ff the pelt, which it does so effectually that not a par- fur is left behind, and yet the pelt is not cut through part. The fur falls down in a light flocculent layer ndless apron beneath, from whence it is removed when t is denuded. This fur is of three or four different s, that from the cheek being the finest and most e; and to separate them one from another a method at mple and elegant is adopted. The fur is placed in a hest or trough, where it comes within the action of a olving two thousand times in a minute; the current by this fan is so violent that it whirls the fur along w trunk or channel fifty feet in length. During the of the fur, the relative specific gravities of the fila- effect a separation without any farther interference: which are largest and coarsest fall first, and are de- d on the bottom of the first compartment of the trough; which are next heavier are deposited farther on; and the finest and best parts of the fur are blown to the e end of the trough, whence they can be taken without ture with any of the others.

cutting of the fur from the pelt by machinery has ttempted for various furs, but it has succeeded only in t to beaver; this is said to be owing to the circum- that the beaver-pelt is very regular in thickness and uniform in surface; whereas, most of the other pelts are irregular or unequable. If the blade of the machine by passing over an irregular part of the pelt should cut off a small bit of the latter, it would be the means of spoiling the mass of fur unless removed. Attempts have been made to detach the fur from the pelt by chemical instead of mechanical means. In tanning and leather-dressing, the hair and wool of the animal are often loosened by being exposed for some hours to the action of some acid or other chemical agent: and it has been supposed that the same result would be obtained in respect to fur for hatters' purposes; but it is found, that though separable by such means, the fur is injured in its felting properties—an objection fatal to the adoption of the plan.

Other kinds of fur besides the four above-named are employed in hat-making, but are not so generally serviceable. *Mole fur* is fine and regular, but is almost too short to be available. *Musquash*, or *musk-rat fur* is employed to some considerable extent. *Seal-fur* presents a dull appearance when worked up as a covering to a hat, being deficient in the delicate glossiness which distinguishes beaver. *Otter-fur* is finer than that of the seal, and is so far more serviceable, but it does not take a good black-dye. According to the price at which a hat is intended to be sold so is the selection of the fur employed. A good beaver hat contains in the foundation or body a mixture of fine wool with rabbit's fur, and in the covering beaver-fur alone; this is the standard, from which a departure takes place according to the price. [Hat, P. C.]

Some kinds of fur which are rather deficient in the felting property are made to undergo a process termed 'carrotting,' so called from the colour imparted thereby to the fur. This consists in wetting the skin (before the fur has been yet cropped from the pelt) with dilute sulphuric acid, and quickly drying it either near a strong fire or by means of a heated iron passed over it. The fur of the same species of animal often differs very much in felting quality, according to the district where the animal is found. Thus, the fur of the rabbit is said to possess a stronger felting quality when obtained from an animal reared near the sea-coast than from an inland animal: those of the eastern coast of England, from Lincolnshire to the Tweed, are considered the finest. The fur of the English hare, as a second example, is found to be both finer in quality and stronger in felting power than that of any other variety of the hare.

Dressed Furs.—By this term may be designated those furs which are retained on the original pelt, and in that state worn as garments or trimmings of garments, in the forms of cloaks, tippets, cuffs, collars, &c. Such an employment of furs was very much a matter of necessity among the rude tribes where the custom was first followed. At first the skins were worn almost in the state in which they were taken from the animals; but as luxuries advanced, the art of dressing the skins became established, and fur took rank as an adornment as well as a covering. We find that, by about the beginning of the fourteenth century in England, the custom of wearing costly furs had reached such a height, that Edward III., in one of his sumptuary laws (A.D. 1337) enacted, that all persons who could not spend a hundred pounds a year should be absolutely prohibited the use of furs.

The dressing of furs for this purpose, or 'furriery,' is much more simple than the preparation of felting-fur for the hatter, since it does not involve the separation of the filaments from the pelt beneath.

The fur-hunters of America, when they have captured a beaver or other fur-bearing animal, strip off the skin, and hang it up to dry, either in the open air, or in a dry and cool room where there is no fire. Great importance is attached both to the drying and to the careful packing of the skins; for if the slightest degree of putrefaction ensues, the fur loses its firm hold of the pelt, and is not fit for furriers' purposes. When the skins are brought to England, and placed in the hands of the furrier, he examines them minutely, to see that the drying has been properly effected, and the pelt in a firm state. He then proceeds to the two processes which constitute the main part of his business, viz. extracting the greasiness from the pelt, and also a kind of oil which is in the fur itself. The skin is put into a liquid containing bran, alum, and salt; and after sufficient steeping it is worked about and scoured, so as to remove the grease. The fur is cleansed from its oiliness by an application of soda and fine soap. The cleansed skin is finally washed thoroughly in cold water, and hung up to dry. The alum and other ingredients employed in scouring the pelt effect a kind of tanning or tawing process, by which the pelt is converted into a sort of thin leather, and thereby rendered more durable.

When thus far prepared, the skins are ready to be worked up into the form of garments, or materials for garments. In order to give the surface of the fur a uniform length and colour of fibre, it is often necessary to cut up a great many skins, and sew certain pieces of each edge to edge; for it is rarely if ever the case that every part of the same skin is of one uniform colour. The cutting up of a skin thus becomes an important affair; for unless considerable tact be exhibited, many of the smaller pieces would run to waste. The furs which are used for these purposes are in general different from those selected for felting; they comprise usually the grey, the silver, and the black fox, the sable, the bear, the lynx, the ermine, the mink, the chinchilla, the marten, the wolf, the fitchet, and a few others of less common character.

The preservation of furs, when kept in hand for manufacturing purposes, is a point of considerable importance, from the several sources of injury to which they are exposed. If kept too damp, they rot; if too dry, they diminish in weight. 'The great enemy to all furs,' says a practical writer on this subject in the 'Encyclopædia Britannica,' 'is the common moth. This destroys the felting principle. Whenever the slightest
appearance in the fur indicates the secure lodgment
creature it ought immediately to be used; or, if
be done, it should be taken out of the paper-bags,
all over with a small switch rod, or, what wil
purpose still better, a hatter's bow. The same r
the keeping of skins in good condition as to fur.
tion ought to be cool, dry, and well aired. They
keep longer than twelve or eighteen months, w
great risk of suffering injury from the moth
Too many ought not to be heaped together, and
they be rabbit-skins, because the fat or grea
skins will get heated, run amongst the fur, an
such an acrid nature as to corrode the very pelt
persons are inclined to keep hare and rabbit
time, from a notion that the fur upon them wil
length from the moisture left in the pelt. This
erroneous opinion. Any one who will make th
will find that the amount of fur obtained
quantity of skins is much greater in weight when
immediately after they are taken off the anim
having been kept for six or twelve months.'

FURZE. [Ulex, P. C.]

FUTURE. [Conjugation, P. C.]

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G.

DI. The name of a celebrated old Florentine family s of the thirteenth and fourteenth centuries.

o Gaddi, the contemporary and friend of Andrea d Cimabue, was born at Florence in 1249, according ri. Gaddo was a painter and mosaic-worker, and Tafi in the Mosaics of San Giovanni. He executed e mosaic of the 'Coronation of the Madonna,' in Maria del Fiore, which is still extant. This work him a reputation all over Italy, and he was ordered by Clement V. to Rome, to execute some mosaics in w church and palace of San Giovanni in Laterano, was rebuilt after the fire of 1307. He executed other n St. Peter's, and in Santa Maria Maggiore, which last ist. There is also a Madonna by him in mosaic in edral of Pisa. He executed some paintings in *tem*-ut they have all perished. He died in 1312, and was n Santa Croce, where his son Taddeo painted his por-side that of Andrea Tafi, in a Marriage of the Virgin Capella Baroncelli.

deo Gaddi was a much more able man than his father, hose death he lived twenty-four years with Giotto, who godfather. He was the most distinguished of Giotto's s and imitators.

ri mentions the paintings of the sacristy of Santa in Florence, as Taddeo's first works; the altar-piece, r, of this chapel, is altogether similar to the other gs, and it bears the date of 1378, which was some fter the death of Taddeo: the portion which Vasari es to Taddeo are the five subjects from the life of the en. The frescoes of the Baroncelli (now Giugni) in the same church, representing the life of the also by Taddeo, according to Vasari, are in a different nd in one which assimilates more with the character-yle of the period. Taddeo enlarged somewhat upon the Giotto; he gave more bulk and motion to his figures. escoes of this chapel are perhaps the best of his works main; they have been engraved by Lasinio. Taddeo also in Santa Maria Novella, and other churches at ce, and at Arezzo, and in 1342 at Pisa; but little of his works besides those mentioned above, and a few ltar-pieces in *tempera*, in the gallery of the academy at ce and at Berlin.

anta Maria Novella Taddeo painted, in fresco, a wall e ceiling of the Capella degli Spagnuoli, formerly the r-house. The ceiling represents the Resurrection and cension of Christ, the Descent of the Holy Ghost, and aved from Shipwreck: in the Resurrection light pro-om the body of Christ. The painting of the wall is tly an allegory to the glory of St. Thomas Aquinas, norating his extensive knowledge and his great ser- the church. The other walls of the chapel were by Memmi at the same time as the works of Taddeo ecuted, but are much inferior to them; on one of the re the reputed portraits of Petrarch and Laura. 's works in this chapel are the most considerable efforts ing of the fourteenth century; but they are not in a t state of preservation to judge adequately of their yet sufficient to justify his reputation of the best an of his age or century. In composition he was sym- l and crude; in character natural, and in expression erior but equal to Giotto. Taddeo was likewise a dis-hed architect; he built the present Ponte Vecchio in nd the Ponte della Trinità, which was destroyed by d of 1557, and was replaced by the present bridge by nati.

leo Gaddi amassed great wealth, by means of which ablished his family, and the Gaddi have been for enturies one of the most distinguished families of Flo- It is not known when Taddeo died, but Rumohr has that he was still living in 1366, when, according to he must have been in his sixty-sixth year. He was near his father in Santa Croce.

most distinguished scholars were Giovanni da Milano copo da Casentino, to whom he entrusted the care of s Giovanni and Angelo: the former died young, after great promise as a painter.

elo Gaddi excelled in colour, and generally in the technical practice of the period, which appears to have been thoroughly established in his time. He, however, executed several great works, especially in Santa Croce, where he painted the history of the Discovery of the Cross; but they are all in imitation of Giotto and his father, though he was inferior to both in expression and to his father in design.

He executed many works in Florence in various churches; and he visited Venice not only in the capacity of a painter but as a merchant also. He established a commercial house there, together with his sons, and realized a great fortune: his sons devoted themselves exclusively to mercantile pursuits. He died, according to Vasari, aged 63, and according to Baldinocci, in 1389; but if he died at that age the date can scarcely be correct, if the fact, as implied above, is true, that he was young when his father died.

Angelo left two distinguished scholars, Stefano da Verona, and Cennino Cennini, who is the author of the earliest known treatise on painting—'Trattato della Pittura,' Rome, 1821· it was written in 1437.

(Vasari, *Vite de' Pittori*, &c.; Speth, *Kunst in Italien*; Rumohr, *Italienische Forschungen*.)

GAERTNER, JOHANN ANDREAS. Descended himself from a family of architects, this Gaertner claims notice both on account of his own professional talents, and as being the father of the present celebrated Friedrich von Gaertner (born at Coblenz in 1792), now (1845) chief architect to the king of Bavaria, and who has adorned Munich with some of its noblest and most monumental structures.

Though we speak of this architect (Friedrich) merely incidentally, not biographically, yet as the opportunity offers itself we give a list of his principal buildings down to 1844, viz.:—The Ludwigs-kirche, Bibliothek or Public Library, University, Damenstift, Priester-Seminar, Blinden-Institut, Salzamt, the Ludwig Gate, and Feldhernnshalle, all at Munich; the Residenz, or new palace, at Athens; the Befreiungshalle at Kelheim, a colossal monument of rotunda form, intended to commemorate the liberation of Germany; the Palace at Wittelsbach; the magnificent Pump-room at Kissingen, and the Pompeian House at Aschaffenburg. Contrary to either Schinkel or Klenze, this architect chiefly affects the Byzantine or round-arch style. He has just begun to publish the designs of his buildings in large folio size, but as yet only some of the plates have appeared without any letter-press, and without even so much as a notice to say whether there will be any at all, or what will be the probable extent of the work.

Johann Andreas was the son of a former Andreas, a Dresden architect and artist of considerable reputation in the early part of the last century; and was the nephew of Johann Gaertner, a clever architect of the same period and the same place. He was born at Dresden in 1743, and was at first more inclined towards the military profession; but going to Poland he was induced by Count Minitszek not to give up architecture entirely, but rather to apply himself to engineering also, and he was employed by that nobleman to erect various buildings upon his estates. After that he visited Vienna, Berlin, and Paris, in which last capital he remained nine years, when he was invited to Coblenz, to finish the Residenz or electoral palace there. He next entered the service of the Prince-bishop of Würzburg, being glad to quit Coblenz (where his son Friedrich was born), the disturbances arising out of the French Revolution having both rendered that city an insecure place of abode, and cut off all prospect of professional employment. He erected several buildings at Würzburg, and in its neighbourhood, all of which display superior talent and taste; among others the theatre, and restorations of the Church of St. Michael at Würzburg, and Count Schönborn's château at Gaibach; and he continued to reside at Würzburg after political changes had annexed it to Bavaria, and after he himself had been nominated as a Bavarian architect, for he did not remove to Munich till 1804, when he had been appointed Hofbauintendant there. He did not however find opened to him in that capital the enlarged scope for the display of his abilities which he had promised himself, for of the various designs which he produced, scarcely any—none of the more important ones—were adopted for execution. Towards the close of his life he felt the disappointment so bitterly, that instead of selecting his best designs and publishing them as a memorial of his talents, he destroyed them with his own hands, as if to prevent others from availing themselves of the ideas which he had been able to work out only upon paper. From this circumstance it may be inferred that he felt protracted life—and he did not die till 1826, when he was in his eighty-third year—to be attended with other penalties than those annexed to old age. Could he have foreseen how much more prosperous a career was reserved for his son, he would probably have borne his own disappointments with less impatience of temper.

GA′GEA, a genus of plants belonging the natural order Liliaceæ, and the tribe Asphodeleæ. It has a perianth of 6 patent leaves, the stamen adhering to the base of the perianth; the anthers erect, attached by their bases. The flowers of the species are corymbose or umbellate.

G. lutea (the Ornithogalum luteum of many botanists) has the radical leaves usually solitary, linear-lanceolate, flat; the bracts 2, opposite; the peduncles umbellate, simple, glabrous; the segments of the perianth oblong, obtuse; the bulb ovate, solitary. The stem of this plant is about six inches high, and shorter than the leaves. Its flowers are yellow. It is a native of England and Scotland in woods, but is a rare plant. It is a native of Europe, and is found on the Alps in Switzerland. Koch describes ten species of this genus as natives of Germany and Switzerland.

(Babington, *Manual of British Botany;* Koch, *Flora Germanica.*)

GAILLONI′LLA, one of the abundant infusorial fossils of Franzenbad in Bohemia.

GALANI′NO, the name by which Baldassare Aloisi is generally known. He was born at Bologna in 1578, was educated in the school of the Carracci, and became one of the most distinguished of the Italian portrait painters: he is sometimes called the Italian Vandyck. He practised chiefly at Rome. Galanino was also a very able historical painter and a skilful etcher: he died in 1638.

(Baglione, *Vite de' Pittori*, &c.; Malvasia, *Felsina Pittrice;* Bartsch, *Peintre Graveur.*)

GALASHIELS. [SELKIRKSHIRE, P. C.]

GALEOPSIS, from γαλῆ, a 'weasel,' and ὄψις, 'sight,' 'aspect,' the mouth of the corolla gaping like that of a weasel, a genus of plants belonging to the natural order Labiatæ or Lamiaceæ. It has the anthers approaching in pairs, opposite cells bursting by two valves transversely; the upper lip of the corolla arched, and the lower lip three lobed, unequal, with two teeth on its upper side; a tubular 5-toothed calyx, with equal teeth, or the two upper ones longest. The nuts are rounded at the end. The species of this genus are annual, divaricately branched, erect herbs and rarely decumbent at the base. The flowers are red or cream-coloured, or varied with both these colours. This genus may be easily recognized by the peculiar formation of its anthers, which differs from any other of the Labiatæ.

G. ochroleuca, the cream-coloured Hemp Nettle, has a softly pubescent stem with deflexed hairs, not thickened below the joints, oblong or oblong-lanceolate leaves, clothed with soft villi on both surfaces. The calyx is shaggy and glandular, and the upper lip of the corolla deeply cut. This species is found in the sandy corn-fields of Middle Europe, and also in England and Wales. The flowers are of a pale yellow or cream colour, and bloom during the months of July and August.

G. ladanum, the red Hemp Nettle, is distinguished by having the upper lip of the corolla slightly notched. It is a

GALILEO. A short time after the ar
P. C., was published, there appeared in a l
Catholic publication, the 'Dublin Review' (J
v. pp. 72-116), a controversial article upon
interference of the Inquisition. This article
cited, and seems to be considered by some,
English and Irish Roman Catholics as a tri
to the account usually given. We shall here
the main assertions, and the question which aris

We have already [MOTION OF THE EART
pressed our opinion of the use which is made of
by Protestants: and we repeat that Catholics
right to consider the manner in which this
upon as a high compliment to the authority w
many centuries possessed the power of doin
more on every day of every year. That the
ing was disgraceful to the parties concerned
mitted even by Catholics; but the question,
has not been fairly handled by Protestants, is,
parties can claim to be the representatives of th
declares itself infallible in matters of faith.
of Galileo's trial depends upon its connexion
tion; and party zeal has mixed up with it all
cussion upon the character of the proceeding
motives of those who originated it. English
well to remember, with regard to the latter p
Star-Chamber and the astronomy* of the Act

Even in Italy the defence of the Inquisitio
and openly given up by many. Witness
silence of the account of Galileo, in the 'Elo
illustri Toscani,' Lucca, 1772, taken from
Milan periodical; the declaration of Frisi (M
'the imagination is horrified, and the virtuous
shudders,' at the language applied to Galileo
passed upon him; and that of Fabbroni (Pisa,
is better to be silent upon the details than by
to increase the horror which every virtuous mi
against the injustice of that time.' And the art
lin Review styles the Inquisition 'superlativel
more mild and sparing of human life in Ro
mild than superlatively cruel.

That the Roman Church decided against th
has been generally affirmed by Protestants,
Catholics, we believe with justice. But
which claims infallibility in essential matte
local tribunals, the office of which was the
heresy, to pronounce, and, as it turns out
wrongly, upon a question of astronomical fac
versally admitted. Nevertheless, even this
gether by the author of the article before us,
of the matter is as follows—That Galileo, i
tent with supporting the Copernican doctrine
it was open to him to do, persisted in invadi
admitted to be the prerogative of the chur
that the sacred Scriptures could be interpret
lemy and for Copernicus; and this, in spite o
warnings, that he must confine himself to 'd
system,' and writing 'as a mathematician,
hypothesis.' That when the first attempt was
in 1615 (which was rejected by the Inquisit
ality), as much licence as the above was disti
as given to all. That the prohibition of 16
write in favour of the Copernican doctrine, w
to Galileo only, not to others, and was broug

were merely cited in the preamble of the sentence,
not there to be taken as anything but recapitulation.
e word heretical, in the proceedings of the Inquisi-
the *stylus curiæ*, and that even offences against morals
ablic peace, apart from all doctrine, must be styled
, before that court can assume jurisdiction.

e above are the following assertions. 1, That any
ept Galileo, restrained for his own misconduct) was
y to teach the earth's motion as true, provided he
himself to philosophy, and let theology alone. 2,
Inquisition pronounced no opinion upon the truth of
rine. 3, That it pronounced no opinion upon the
y of the same. We deny each of these positions,
clearest reasons, which we shall bring forward.
o not deny that much has been stated which, when
xamined (for articles in reviews do not deal in refer-
would probably establish the fact that the prohibition
was mainly due to the injudicious ardour with which
pressed the theological question. Nor do we deny
conduct of the philosopher was weak and ungrateful
g into the mouth of the wrongheaded personage of
gue the arguments urged to him in personal confer-
his benefactor Urban, with a hint that they came from
uarter. All parties admit that it was the irritation of
e at this conduct which led to the final proceeding.

the first of the preceding assertions. There were, at
e in question, three distinct modes of maintaining a
First, as a mathematical hypothesis, assuming it not
but as sufficient to explain phenomena, and leaving
or falsehood aside, or even implying the latter. Se-
as a truth, but without any reference to the Scrip-
maintaining it by arguments, and implying that if the
res really assert the contrary, there must be something
n those arguments, but that if the latter really amount
nstration, then the interpretation of the Scriptures,
makes them assert the contrary, must be wrong.
, as an absolute truth, confirmed by reason and Scrip-
th. In the article we are examining, the first and
f these modes are confounded: and it is thought that
alileo was warned off the third mode, and told to
s a mathematician and by way of hypothesis,' and to
himself to 'demonstration,' he was left with permis-
use the second mode. This is not correct, but the
is a natural one. We have already seen [Demon-
s, P. C.] that demonstration, as applied to physical
sis, meant only explanation: and that it could be said
false hypothesis might give true demonstration; that
t be shown to be capable of accounting for pheno-
To learn how matters stood in the present case, we
ook to the words of the authorities. Of these there
wo, the Inquisition, which took cognizance of the acts
etics, and the Congregation of the Index, which ex-
and censured their books. In one and the same year
) the former silenced Galileo, the latter condemned the
work of Copernicus, and the writings of his followers.
ecree which condemns them calls the doctrine of the
motion 'false, and altogether contrary to Scripture.'
this decree prohibits not only the work of Foscarini,
endeavours to show that the doctrine is not contrary to
re, but also that of Copernicus, which does not touch
stion of theology. This is plain enough, but we can
t still plainer. Four years after (1620), the same
ls of the Index, finding that the work of Copernicus
y slight alterations be made to speak the language of
sis, published the corrections under which they would
to be read. We put a few sentences of the work
side with the alterations dictated by authority:—

Copernicus.	*Correction required.*
question (of the mo- the earth) is not yet and is not to be de- by any means.	It matters nothing whether the earth be taken as the centre [remember that the word centre in those days implied immoveability] or not, as far as solving the phenomena of celestial motions is concerned.
e then there is *nothing* *ler* the motion of the	Since then *we assume* the motion of the earth
he triple motion of the heading of a chapter).	On *the hypothesis* of the triple motion of the earth.
e three stars (the earth ne)	Omit these words, because the earth is not a star, as Copernicus makes it to be.

This surely will settle, in reasonable minds of all persuasions, the question how much is permitted to a person speaking as a mathematician, and by way of hypothesis. If Copernicus say the earth is a star [a word implying motion], the cardinals strike it out: if that it may be so, they alter it into a professed assumption for purposes of calculation. How indeed could they allow *nihil prohibet* on an opinion described by themselves as *Divinæ Scripturæ omnino adversantem?* For the documents cited see Riccioli, *Almag. Nov.*, lib. ix. sect. iv.

Next, as to the assertion that the Inquisition pronounced no opinion on the truth of the doctrine. The two propositions, affirming both its falsehood and heresy, were drawn up, it is said, by the qualificators or qualifiers, inferior officers of the court, and not the court itself. This is a strange argument, and to make it relevant it must be shown that the declaratory power of the Inquisition was lodged in its inferior officers, and not in its judges. If the tribunal were so constituted, it matters nothing to the point in question; for the qualifiers did declare against the doctrine, that is, the court did pronounce a decision in its usual form and manner, and we assert nothing more. All that was done in any other case was done in this one. But in point of fact, it will be found that the qualifiers are only the assistants of the judges; and the voluntary adoption of their conclusions by the cardinals makes those cardinals themselves the responsible parties. But further: it is not true that the final sentence of 1633 did no more than state the theses of the qualifiers as recapitulation of the proceedings of 1616. The defence before us asserts that the Inquisitors 'did not at all trouble themselves with considering the truth or falsehood, the innocence or poison, of the opinion asserted.' To this let the sentence itself reply:—'And that this pernicious doctrine might be altogether removed, and might not further creep in, to the great injury of Catholic truth, a decree emanated from the Sacred Congregation of the Index, by which the books which treat of this doctrine were prohibited, and the doctrine itself was declared false, and altogether contrary to Scripture. But since a book has appeared at Florence in the past year (1632), of which the inscription shows that you [Galileo] were its author, the title being *Dialogo* &c., and whereas the sacred Congregation has come to know that since the printing of that work the false opinion of the motion of the earth has increased more and more from day to day, the said book was diligently considered,' &c. And in the recantation Galileo is made to say that the opinion of the earth's motion is false and heretical, and that he abjures and detests that error and heresy. It thus appears that there are four parties who declare the doctrine false and heretical—the qualifiers, the Inquisitors, the Congregation of the Index, and (perforce) Galileo himself.

Next, as to the question whether the Inquisition declared the doctrine heretical. That, as far as its authority extended, and in its own usual sense and meaning of the word, it did do so, is clear enough from what precedes. But, as may be supposed, a general word which belongs to an extensive system of law has many uses. The argument about the *stylus curiæ* seems to us unanswerable. In our Court of King's Bench, peaceful persons are adjudged to have done many things by force and arms, because the court, originally instituted for matters connected with the King's peace, had no other way of widening its jurisdiction for the relief of the subject, except by interpreting one class of injuries after another as acts of violence. The Inquisition, instituted for the suppression of heresy, and having no choice but to determine all causes sent before it by the Pope (as was that of Galileo), was as much compelled by its forms to consider every point with nominal reference to heresy and orthodoxy, as the Court of King's Bench to decide actions for breach of contract, on a supposition of money detained by force. Whether the maxim of our law—*in fictione juris semper subsistit æquitas*—can be applied to the Office called Holy; whether the high authority which Catholics reckon to be infallible when it *does* pronounce a decision was not culpably negligent in withholding its power from the scene of action, and in allowing an inferior tribunal to assume the function of interpretation which it asserts to belong peculiarly to itself—are questions on which Catholics themselves are likely enough to be divided in opinion. But however this may be, to require them to admit that their church has decided against the motion of the earth, as a matter of faith, and in its asserted infallible character, is to ask them to yield more than the opponents of the disputed doctrine ever thought they could claim as having been done for them. On this point we can cite a most unwilling contemporary witness, Fromond of Louvain, whose 'Antarista chus,' written against the motion of the earth, was published at Antwerp in 1631. Fromond was a very zealous Catholic, an ardent opponent of the Copernican doctrine, and a firm believer in the fact of the sacred writers having intended to declare the stability of the earth. One of his chapters is thus headed, 'Is the Copernican opinion now to be held heretical?' This of itself is something, for it is to be remembered that the work had passed through the hands of the united censure of Philip IV. of Spain and the ecclesiastical authorities. What would these examiners have said to a work on the Nicene Council with a chapter headed 'Are the followers of Arius to be considered as heretics?' But to proceed:—Fromond, who wants to get all the condemnation that he can for his opponents, begins by citing Catholics who have expressed opinions on the subject: and it is remarkable how mild the censure is, even of those who wrote after the decree of the cardinals. Tanner says the opinion is 'condemned, and cannot any longer be safely held;' Mersenne, that 'any one may justly think it rash,* particularly after the manner in which the cardinals have expressed themselves.' The author goes on to state, with a slight, but very slight, tone of reproach, that there are men, both learned and Catholic, in Italy, France, Germany, and Belgium, who care little for the opinion of the cardinals, and who say that the power of these dignitaries is not supreme and pontifical, and that until this last-named power is exerted, they are safe and not within the limits of heresy. But Fromond doubts whether they are 'safe enough.' He points out that the books which are in the Index are condemned (according to the bull of Sextus V., which modelled both the Index and the Inquisition into the form which they had when Galileo was silenced) by the authority of the pope, expressly delegated for that purpose; and he then feels justified in drawing the following inference. 'If' says he, 'the general opinion of the Catholics of our time be correct, namely, that the pope speaking è *cathedra* cannot err, though not supported by a general council, then it is all up with Copernicus, and his paradox (to use a gentle word) appears rash, and next thing to heresy, ay, even more.' Having thus, as it were, made his utmost point, and still not got quite as far as heresy infallibly pronounced, he checks himself thus: 'This is what a severe judge might think. But when I consider how circumspect and free from haste pontiffs generally are in their decrees on matters of faith è *cathedra*, and also their practice of making those decrees in their own names and not in those of others, and since Sextus V., in the diploma which established the fifteen congregations of cardinals, expressly says, "Of those decrees which relate to the dogmas of the faith, we reserve the interpretation to ourselves"—it seems necessary to mitigate the censure a little, and right to suppose that the authority of the congregation of the Index is not equal, but inferior, to that of the pope.' He ends by saying that though the Copernican has (unless the pope should otherwise decide) one foot inside the door of heresy, yet he would not dare to pronounce him an open heretic, without something more express from the head of the church. The bull of Sextus V., as we see, contains an express limitation of the power of the several congregations; and the language and arguments of Fromond (to whom we might join other writers, but not of so satisfactory a character, as being themselves Copernicans) prove that this renunciation of the charge of heresy, this declaration that the asserted infallible power never showed itself, is no subterfuge of modern Romanists, but was the argument of the time when Galileo was under the ban; was held, among others, by a distinguished opponent of the Copernican doctrine, the very last person who was likely to have had any bias towards such reasoning; and was allowed to pass a strict censorship of the press.

But not only do Catholic writers thus express themselves, but contemporary Protestants, the most staunch opponents of Rome, accept the interpretation. Thus Bishop Wilkins, a decided Puritan, writing in 1640, after stating that some individuals, as Serrarius, expressly condemn the Copernican doctrine as a heresy, proceeds as follows: 'And since him, it hath bin called in [question?] by two Sessions of the Cardinals as being an opinion both absurd and dangerous. As therefore likewise doe they punish it, by casting the Defenders of it into the Pope's truest Purgatorie, the Inquisition: by yet neither these Councels, nor any (that I know of) among them, have proceeded to such a peremptorie censure of it, as to conclude it a heresie; fearing, perhaps, lest a more exact examination, and the discoverie of future times, finding it to bee an undeniable Truth, it might redound to the prejudice of their church, and its infallibilitie.'

It is moreover to be remembered that the Inquisition, and even the Congregation of the Index, was a local [illegible] incompetent to legislate for the faith of all Roman Catholics. There was nothing in what was done by the Italians to hinder the Spanish Inquisitors from declaring in favour of Copernicus, if such had been their pleasure: and, in fact, we have searched the Spanish Index of 1667 in vain for the name of Copernicus, though some of his followers are in the list.

Lastly, if we remember the controversy which has always existed in the Roman world as to the character of decrees emanating from the Roman See alone, without a general council, we shall see that it would have been very unlikely that a pope should have raised this question in France, Spain, and Germany, upon a matter which might any day be settled against him by absolute demonstration. Tiraboschi looks upon it as a special Providence that the Church was not allowed to commit itself; and we apprehend that most Roman Catholics will be of his opinion. But they must admit, as they have had to do in many other cases, that their earthly head used his power in a most unworthy manner, and found agents who were the subservient creatures of his irritated feelings. Protestants, on the other hand, should beware how they weaken the general argument against the infallibility of the Roman church, by practically owning that it cannot be successfully attacked except by denying to those who maintain it the right to be the interpreters of the sense in which they use their own words.

Though we differ entirely from the article in the 'Dublin Review,' the substance of which we have quoted, yet it is right to say that we find in it a large quantity of collateral information, put together in a manner which strikingly exhibits the under current of favour which was setting towards the doctrines of Copernicus, when its imprudent advocates began to mix theological with their physical arguments. Had we intended this comment to be a biographical one, we should have had to make use of its details; and we should be very glad to see the numerous interesting citations which it contains worked into truer history, supported by fuller references, and dignified by milder language towards opponents.

GA'LIUM (from γάλα, 'milk'), a genus of plants belonging to the natural order Galiaceæ or Rubiaceæ. The corolla is rotate, 4-parted; the fruit dry, not crowned with the calyx, and composed of 2 indehiscent 1-seeded carpels. The species are branched herbs with variable inflorescence.

G. cruciatum, Crosswort, has elliptic oblong hairy leaves, four in a whorl; the flower-stalks lateral, corymbose, bracteated; terminal fertile flowers, mostly staminiferous; the fruit-stalks deflexed, and the fruit smooth. It is a native of Europe, and is commonly found in Great Britain.

G. mollugo, Great Hedge-bedstraw, or Wild Madder, has about 8 leaves in a whorl, they are lanceolate-obovate or obovate-oblong; the margins rough with prickles pointing forwards; the branches of the panicle many-flowered, the lower ones spreading horizontally; the fruit glabrous. This species is a native almost throughout Europe and the Caucasus, and is found in Britain. The flowers are white, and sometimes yellowish. The roots are creeping, and yield a red dye like the true madder, but of a brighter colour; they also have the property of colouring the bones of animals that feed upon them. This plant has been extolled by M. Jourdan, the director of the hospital at Tain in Dauphiny, as an effectual cure for epilepsy. It is however to be feared that the cases he details, which are certainly very marvellous, will not justify his reliance on this remedy.

G. tinctorium, the Dyer's Bedstraw, has smooth decumbent stems; linear obtuse leaves, scabrous on the margin and keel; elongated, axillary, terminal, and many-flowered peduncles. The corolla has 4 obtuse lobes, and the fruit is smooth and glabrous. This species is a native of North America, in low marshy places, especially in Canada and Newfoundland; it is also found in the Straits of De Fuca. It is very nearly allied to *G. trifidum*, but is distinguished by the stems being smooth and the flowers always 4-parted.

G. palustre, a native of Great Britain, nearly resembl

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* This word rash, *temerarius*, is of great force. It had a technical meaning, and was constantly used at the time of which we write, as for aught we know it may be now, as an epithet distinctive of an offence minor to heresy. Accordingly when a priest styles the opinion *rash*, it is to be inferred that he would refuse to say it was *heretical*: just as, hearing a lawyer call an offence manslaughter, we should suppose him to deny that it amounted to murder. So that, when Mersenne qualifies as only *temerarium* that which the court of which he is speaking had pronounced *falsum et formaliter hæreticum*, he limits the power of that court in the same manner as Fromond did, though more briefly.

rium when the leaves are more numerous than
t is said that from the roots of this plant the Indians
e red dye with which they colour their feathers and
ents of their dress.
entrionale, the Northern Bedstraw, has erect tetra-
ooth stems; oblong lanceolate leaves, 4 in a whorl.
is beset with hooked bristles; the flowers are nume-
of a milk-white colour. The Cree women use the
is plant to dye red. It is a native of North America,
lakes of Canada and the United States.
um, Ladies' Bedstraw, or Cheese-rennet, is distin-
y having its leaves about 8 in a whorl, linear-seta-
h revolute margins, channelled above, downy beneath.
ers in numerous small dense panicles of a golden
lour. On loose sandy soils the flowers are some-
tary and the stems much more branched, but agree-
ther respects with this species. It is a native of
nd Siberia, in meadows, woods, and among bushes,
ound in Britain very commonly in dry soils. The
l flowers of this plant have been used in the cheese
For the purpose of curdling milk, and also for colour-
Mathiolus says it produces an agreeable flavour and
e cheese 'eat sweeter.' The French formerly used
ibe the flowers in hysteria and epilepsy. The roots
rich red dye, superior in colour to madder. It was
one time as a substitute for the true madder, *Rubia*
a, but the roots are too small to render its culture
e. This plant seems to be the γάλιον of Dios-

arine, the common Goose-grass, or Cleavers, has
to eight leaves in a whorl; they are linear-lanceo-
h marginal prickles pointing backwards; axillary
d peduncles; reflexed granulated fruit. It is a native
ut the whole of Europe, north of Asia, and North
, in hedges, fields, and most cultivated places; it is
in Great Britain. This plant, according to Burnett,
ifully called by the Greeks *Philanthropos*, as they
l the readiness with which it cleaves to our habili-
a love of the human species. A mechanical cause
ever fully account for this tendency. It is thus
quired the names of Cleavers, Catch-weed, &c., and
ng a favourite food or medicine of geese, that of
ass. Dioscorides relates that this plant was used by
herds of his time as a sieve to strain milk, and Lin-
s us it is still made use of in Sweden for the same
It is the ἀπαρίνη of Theophrastus. The ex-
juice of this herb taken in doses of four ounces or a
of a pint night and morning, during several weeks,
to be a very beneficial remedy in cutaneous disor-
d is believed by the country-people to be a purifier
lood and an antiscorbutic. The seeds have a corneous
, and when roasted have been used instead of coffee.
not aware that they have been analysed, but it is not
ble that they contain a principle similar to caffeine,
his be the case, they would form a valuable substitute
e. The roots of this species, like most of the genus,
rich red dye, and birds that feed on them have their
ged with the colour. The roots of G. tuberosum
aceous, and in China are cultivated as a dietetic
e. Loureiro says that, when boiled, they are both
ne and nutritious. Don enumerates 164 species of
which are distributed in every quarter of the world.
mon name Bedstraw given to all the species, is
verb to *strew*, antiently written *straw*. Before the
tion of modern luxuries beds were made by strewing
ious herbs, and doubtless this was one used for that
and has thence acquired its common name. These
re very easily cultivated and propagated; they will
any common soil, care being paid to the situations
h they are placed, which should as much resem-
r natural positions as possible; those brought from
and bogs should have a moist soil, and the natives of
climates should be protected during the winter. None
however are worth cultivation unless in botanical

, *Synopsis Plant. Floræ Classicæ*; Don, *Gar-
Dictionary*; Burnett's *Outlines of Botany*; Babing-
nual of British Botany.)
LA. [ABYSSINIA, P. C. S., p. 23.]
LERY, a name of distinction given to a room either
nt of its extent and proportions, or to one or more
pecially appropriated to pictures and other works of
nce the term 'Gallery' is extended to the collection itself, without any reference to the building. Thus what answers to the term in one sense may not in the other; or it may do so in both. In architectural language a room can hardly be called a gallery unless its length be three times its width, for else, though as a room it might be considered long, as a gallery it would be short; therefore if a spacious apartment, it would answer to the character of a hall, as is the case with the Waterloo Gallery in Windsor Castle, whereas the adjoining St. George's Hall, might more appropriately be termed a gallery, its proportions being those of one [WINDSOR CASTLE, P. C.]; on the contrary, the Victoria Gallery, in the new Palace of Westminster, will, according to the architect's own admission, be 'avowedly a hall, and not a gallery,' its dimensions being 100 feet by 45, consequently an architectural misnomer has been intentionally given to it. But though the length of a gallery as compared with its breadth ought not to be less than what has been stated, it may be increased to any extent without danger of excess, unless the gallery should thereby be rendered far too pompous and spacious to be at all in keeping with the other apartments, as was generally the case in Elizabethan mansions. The proportion as to height in galleries is regulated solely by width, which may be nearly equal to each other, the height being a little more or less than the breadth, according as the ceiling is arched or flat, because the height being the same, the walls will be lower in the former case than in the other. It is to be observed, however, that a very long gallery will bear to be somewhat loftier than one of moderate length; at the same time it must be borne in mind that the height must not be such as to occasion the effect of narrowness and produce the proportions of a mere corridor. Very low proportions, on the contrary, rather than height, are one characteristic of galleries of the Elizabethan period, so much so that some of them look quite depressed by their heavy flat ceilings, whereas halls in the same buildings are frequently disproportionally high, owing to their occupying two storeys of the building, and being, besides, sometimes not twice their width in length.

There is hardly anything in the interior of a building which lends itself so readily to architectural effect as a gallery, since, if it at all answers to its name, there will at any rate be that of lengthened perspective and vista. In fact the very name itself excites expectations of superior design and taste, because rooms of the kind belong to the luxuries of architecture and are rather intended for state and display than for any actual use as rooms, except on extraordinary occasions. Hence galleries are by no means common even in spacious and sumptuous mansions; consequently it very rarely happens that an architect has an opportunity of exercising his talent for interior design upon what holds out so much scope for the display of it; and this, no doubt, is one chief reason why the subject itself is so slurred over in professional treatises; for it certainly does lie quite out of the track of everyday practice. Still, in itself it is one of such very great interest, that it is rather surprising that no one should ever have thought of giving us a 'Recueil et Parallèle' exhibiting the principal varieties of galleries.

All that can be done here is to indicate some of the principal varieties with regard to mere matters of plan, section, and lighting, independently of style and decoration, and we hardly need say that the value of these latter is greatly enhanced by the effect arising out of the first-mentioned circumstances, for great taste may be shown in the embellishments of such an apartment, and yet its general design may be exceedingly common-place, so that though it may say very much for those who are employed to give the finishing touches to the architect's work, it may say nothing at all for the architect himself. As far as plan alone is concerned, there is nothing calling for remark further than what has already been touched upon with respect to proportions, when a gallery forms a single uniform space from end to end. It is only when we come to *compound plans* that we can obtain *combinations of plan*; and the very first step towards these is the usual mode of merely dividing the room into three compartments by means of columns, but which is practised with scarcely any variety, the number of columns between the centre and the end spaces of the plan very rarely exceeding two, and there being as rarely a decided expression given of division, by boldly projecting *antæ-piers* so as to contract the openings between the several compartments of the plan, and thereby define these latter the more distinctly. Almost the only variation which this very simple sort of division of plan into compartments admits of, arises from the proportions of the respective spaces, and the ratio which they bear to other; that is, accordingly as the end compartments are shallower or deeper in themselves, or are either deep or shallow in comparison with the principal division of the room.

The next step approaching to combination of plan in the simplest form of it, is the making the end compartments curvilinear, that is, either semicircular or segmental but otherwise of the same width as the rest of the room. In regard to the mode of merely dividing off the ends of the gallery by columns, almost the only other matter of plan calling for observation, is that the door leading into the room is almost invariably placed in one of the end compartments, but it should also, if at all practicable, be not on one of the sides, but at the end of the room, and occupy a central position there, the entering any room of the kind at one angle of it, being attended with a disagreeable awkward effect, for we ought to advance directly forward into a gallery, and behold it before us in its full expanse instead of *sidling* into it.

We now come to those combinations where the plan is divided into distinct compartments, all opening into each other, instead of forming a suite of separate rooms. In galleries of this class the arrangement is usually a *triple* one, and the middle division or body of the gallery is almost always considerably larger—that is, longer than the two end ones, besides being distinguished in other respects, whether by greater plainness or greater richness of architecture, or by any other circumstance. Accordingly, an almost inexhaustible fund of combinations and contrasts thus opens itself to the architect: first, as regards *Plan*, there may be more or less of difference and contrast between one portion of it and another in respect to shape, size, and proportions; and the variety hence obtainable will be greatly increased, if, instead of the entire plan being of the same width throughout, some parts of it are wider or narrower than others. Neither is this all, for similar contrasts and combinations hold themselves out with regard to *Section*; since, instead of being of uniform height throughout, some parts of a gallery may be considerably loftier than the rest, whether the increased height be given to the body or the extremities; neither is difference of height the only difference connected with section, because, the height being the same or nearly the same throughout, some of the compartments of the plan may have flat ceilings, others vaulted ones. And again, in respect to *lighting*, the body of a gallery may be lighted entirely from above through a lantern or other skylight, &c., while the extremities are lighted either from one side, or by a window at each end of the gallery; or else the opposite mode may be adopted;—matters of this kind depending upon local circumstances and necessities of the general plan of a building.

In order to illustrate what has just been said with reference to varieties of Plan and Section, by positive instances of them, we will take merely three examples of galleries, which all agree in consisting of three divisions, yet in every other respect are of totally different character. The first of them, the Statue-gallery at Holkham (the seat of the Earl of Leicester) is a singularly beautiful though by no means a particularly splendid interior, or one remarkable for its size, the entire length being only 108 feet. It consists altogether of two octagons (21 feet in diameter) and a centre (50 feet by 21), connected together only by an open arch at each end, so that the body is almost shut up from the other two divisions, more especially as although open those arches are set back within *tribunes*, or large semicircular recesses, whereby the full length of the body is increased to 60 feet. Were it not, therefore, that the whole is thrown open from end to end without any separation by doors, the centre would of itself hardly constitute a gallery in the strict architectural meaning of the term, nor would it be a particularly large, though still a very elegant and characteristic room. In this example the centre one is the lowest of the three divisions, its height being 23 feet, while that of the octagons is 32 feet, the ceilings of the latter forming domes, while that of the centre is flat.

The gallery at Castle Howard (the designs of which were published by its architect, the late C. H. Tatham, together with those of the Picture-gallery at Brockelsby) is of quite different character from the Holkham one, for the centre division of it is, though much shorter, of greater diameter than the other two, and also much loftier, it being an octagon of 38 feet, and of the same height, while the other two divisions are each 60 by 24 feet, and 24 in height. The three compartments of the plan are connected into one gallery by two spacious open arches. The effect would, no doubt, have been greatly enhanced had the central octagon been lighted from above instead of from one of its sides. Our third example is the Gallery at Shelburne or Lansdowne House, Berkeley Square, as shown in Adam's designs, where, however, it is far from being satisfactorily explained, there being not so much as a single section of it. Here the three divisions of the plan are very nearly equal in size, the two end ones being rotundas 30 feet in diameter, and the middle one 30 feet in breadth by only 8 feet more in length. The whole, however, is thrown more into a single apartment than is the case in the two preceding instances, the openings between the respective portions being wider, each consisting of [illegible] open intercolumns. It may be presumed that the two rotundas are lighted from above, yet whether they are also domed, and if so, in what way, is not shown, although some express information would certainly not have been at all superfluous; on the contrary, far more to the purpose than the trivial matters which occupy so many of the plates in Adam's work.

These few instances must suffice, and they will at least serve to make manifest how many combinations (of lines, and of both plans and sections put together), and what [illegible] variety of proportions may be produced. To bring forward other examples would not be difficult; we cannot however forbear adverting to Soane's 'Royal Gallery,' at the House of Lords (which will now shortly disappear), for although of no great size—only 100 feet in its fullest extent, or [illegible] by 20 feet, exclusive of the portion cut off by columns at one end as a vestibule between it and the staircase—it is of exceedingly scenic design and impressive character, replete with perspective and picturesque effect, though it must be admitted that much of the detail is in very poor, not to say very bad taste. For much of its character and effect it is indebted almost entirely to the mode of lighting it, to the arrangement of the windows and lanterns, and to the use of coloured glass in the lanterns, of a uniform warm tint, which shed a sunny hue over the architecture. There is, besides, very great play of outline in the section, the average height of the gallery being only 21 feet, while that of the centre compartment is 28, which is further increased to [illegible] feet by a tambour dome with eight Ionic columns, forming an open peristyle within that lantern; of the smaller lanterns over the two other compartments of the plan the height from the floor is 31 feet. The plan also is marked by a somewhat similar degree of play and variety, for each of the end compartments has an arched recess on each side of it, and likewise [illegible] columns on each side; and this variety and complexity of both plan and section render it impossible to show this gallery in a perspective drawing otherwise than partially and imperfectly, since it requires to be looked at from so many and such different points of view, affording as it does a succession of effects which drawings, even when they are perfectly understood, leave it to the imagination to shape out for itself.

Differ as they may in all other respects, galleries agree in one, namely in forming an extended line; or if they branch out in any direction, the separate parts are still so many straight lines. We are aware of but one instance of a circle being employed for the plan of a gallery, and it is one so remarkable for its beauty as well as singularity of effect as to claim particular notice here, more especially as, besides being quite a new idea in itself, it is capable of being further applied under a variety of circumstances. We allude to the *Glyptotheca* of the Colosseum in the Regent's Park, which, as now fitted up for the exhibition of sculpture (1845), forms a complete circle, with a peristyle of twenty columns of the Ionic order, and as many recesses within the colonnade, answering to the number of inter-columns, except that two of those spaces, one on the east, the other on the west side, are made use of for entrances. The whole is lighted from above, through the compartments (filled in with cut-glass) between the ribs of the roof, which last, instead of expanding itself into a dome, becomes merely a cove in consequence of the cylindrical mass in the centre of the plan, and which may be considered the *core* of the structure, rising up through what would else be a dome [illegible] entire space; and in like manner, were it not for that [illegible] within it, this interior would be merely a rotunda of [illegible] kind, whereas now it is converted into one of altogether different character; though no doubt not with any view at all in the first instance to architectural character or effect of any kind, but solely in consequence of the indispensable necessity of carrying up a staircase in the very centre of the building to the platform which the Panorama is viewed from. It was accordingly sheer necessity which originally compelled

opt a peculiarity of plan that has since been
rned to account; and besides being unusually
ts architectural beauty, this gallery is excel-
trived for the exhibition of either sculpture or
ise, though the peristyle is circular, the wall
be a polygon of as many planes as there are
in this instance twenty: and by being so
eparate compartments or groups, pictures may
etter with regard to some sort of classification
g up on the side of a long wall without division
om end to end. The convex part of such a
cal plan might in like manner be rendered
inging pictures—were such the purpose of the
king that also a circle of columns; the columns
se, *engaged* or attached to the wall, which last
of as many separate planes or flat surfaces as
nd in order to keep up perfect symmetry in re-
umniation the two circles might be so propor-
other that the larger or outer circle would have
umber of the columns on the circumference of
le or cylinder, the intercolumns being of the
both circles. This would of course very greatly
neter of the cylinder, to somewhat more than half
er circle; consequently, supposing the breadth
or space between the two concentric circles of
the same as in the Glyptotheca of the Colos-
e plan would be greatly enlarged, and there
nda fifty feet in diameter in the centre of it;
allery thus planned the *ring* or outer portion
priated to pictures, and the inner one form a
r sculpture. Thus the arrangement of plan
same as at the Colosseum, the architectural
e structure would become different, inasmuch
eased in circumference the *ring* would acquire
earance of a gallery, and in some degree lose
a with another structure built up in the centre
it has hitherto been quite overlooked, the
isposition of plan—and it is one that plainly
itself in the concentric circles of Druidical
monuments as Avebury [Avebury, P. C.]
e—is applicable to a very great variety of

istances being the same, the character of a
modified by the manner in which it is fitted up
ith either some specific destination or a general
y be only a superior kind of corridor uniting
artments, or intended exclusively as a picture-
allery, or library, or partake of the character
, again, either by a miscellaneous distribution
or by one division of the room being assigned
ther to statues, a third to books. There is a
between a long room of the kind that is merely
res, as is the case with galleries in Elizabethan
ne which is built expressly as a picture gallery,
of displaying both the entire collection and
works to the best advantage. We subjoin a
lleries, in addition to those noticed, in order
ective dimensions and proportions may be

	Length. feet.	Breadth. feet.	Height. feet.
n, King's Library. rtments	300	41; 58 in centre	30
ord, Library	198	32	40
	195	12	
, Cambridge, Library	190	40	38
	189	21	
ry. Five compartments	183	32	20
tle	180	24	30
	166	22	22
three compartments; square	163½	19½	15
lace	157	27	
, Statue Gallery	136	25	
	132	24	32
brary	136	14	14
	103	30	22

. AQUILIUS, was a Roman eques and a
. He was praetor B.C. 66. Gallus was a
cius Scaevola, the Pontifex, and obtained a
as a jurist. He was both a skilful advocate
and a learned expounder of the law. The distinguished jurist Servius Sulpicius was a pupil of Gallus; and either edited his works or incorporated them in his own writings. Gallus was praetor in the same year that Cicero was, and presided on the trials on Ambitus (bribery at elections); and accordingly Cicero calls him his colleague (*Topica*, 7), and in another passage he has preserved the legal definition of Littus which Gallus on some occasion gave (*Topica*, 12). Gallus was the author of an edictal rule or formula as to dolus malus (fraud) in matters of buying and selling, which he promulgated as praetor (Cic. *De Officiis*, iii. 14; Dig. 9, tit. 2). The Lex Aquilia, which gave the actio damni injuria (Dig. 9, tit. 2; Gaius, iii. 210), was not proposed by this Aquilius, but by a tribune Aquilius. The high opinion which Cicero entertained of his friend Gallus is expressed in his oration Pro A. Caecina (c. 27), where he pronounces upon him a eulogium which few lawyers have merited: 'The authority of such a man can never have too much weight, whose judgment the Roman people have seen tried in providing security against fraud, not in showing how fraud may be practised; a man who never separated the principles of law (jus civile) from those of equity, who for so many years dedicated his genius, his industry, and his integrity to the Roman people, which integrity was ever ready and ever at command; who is so great and good a man that he seems to have been formed a lawyer by nature, and not by education; so skilful and so learned that not knowledge only but goodness too appears to be the product of the law; whose genius is so powerful, whose integrity so manifest, that whatever you draw from that source you will find to be pure and clear.' Cicero's oration Pro P. Quintio was made before Gallus as judex. Gallus is cited several times in the Digest (50, tit. 16, s. 77; 46, tit. 4, s. 18, &c.), but there is no excerpt from his writings. Gallus devised or expounded some clauses of the formula of Accepitalio (Dig. 46, tit. 4, s. 18). Valerius Maximus (viii. c. 2) relates a case in which Gallus refused to allow a woman with whom C. Visellius Varro had cohabited, to sue on a security which Varro in his illness had given her, and which the woman attempted to enforce when he recovered.

(Grotius, *Vitae Jurisconsultorum*; Orelli, *Onomasticum Tullianum.*)

GALLUS, AELIUS, a contemporary of Cicero, and a learned jurist, wrote a treatise on the signification of terms (Gellius, x. 22), from which a single excerpt is given in the Digest (50, tit. 16, s. 157).

GALLUS, AELIUS. [Arabia, P. C., p. 215.]

GALLUS, JULIUS AQUILA, or Julius Gallus Aquila, a jurist under the empire, of uncertain date. There are two excerpts in the Digest from his Liber Responsorum (26, tit. 7, s. 34, and 26, tit. 10, s. 12).

GALT, JOHN, was born at Irvine in Ayrshire, on the 2nd of May, 1779. His father was a sea-captain in the West India trade. About the eleventh year of his age his parents removed to Greenock; and in that busy town he received an education for commercial pursuits, any literary cultivation beyond this point being the fruit of his exertions in hours of leisure. In conformity to his mercantile destination, he spent some time as a clerk in the Greenock custom-house; whence he was transferred, in the same character, to the counting-house of a mercantile firm in the place. When he was between twenty and twenty-five years of age he left Scotland for London, where he intended to establish himself as a merchant. His literary propensities, however, which had previously led him into frequent compositions, were further nourished by a few months of inaction in the metropolis. The result was, the production of a poem in octo-syllabic verse called 'The Battle of Largs,' portions of which were printed in the 'Scots' Magazine' in the course of the years 1803 and 1804, and on the originality of which (as having preceded Sir Walter Scott's metrical romances) he prided himself not a little in after-life. Other studies, chiefly in history and political economy, were prosecuted occasionally after he had embarked in commerce. He did so in partnership with another young Scotchman; but the partners disagreed, their affairs became entangled, and in about three years the firm was bankrupt. After a short attempt to re-establish himself in business along with a brother, Mr. Galt entered himself at Lincoln's Inn; but determining (partly for the sake of his health) to spend abroad some part of the time before his being called to the bar, he left England in 1809.

His travels lasted for nearly three years. He afterwards described them in two works: 'Voyages and Travels in the years 1809, 1810, and 1811, containing Statistical, Commer-

He edited also, during its short career, 'The New British Theatre,' which was at first intended to contain a series of dramas rejected by the managers; and in which, besides other contributions of the editor, was printed a vigorous tragedy called 'The Witness.' These productions however were composed in the intervals left by undertakings of other kinds, chiefly commercial. In the course of his travels he had devised a scheme for importing British goods into the Continent by way of Turkey, notwithstanding Napoleon's decrees of exclusion; and he spent some time in vain endeavours to obtain support for this plan. On another occasion he acted as a parliamentary agent for a Scottish canal bill. In short, although he soon gave up the design of studying the law, he was resolutely desirous to obtain a footing in some department of active business, and entertained a strong reluctance to considering literature as the main employment of his life.

Down to this time, indeed, his literary success had by no means been great. His works had not generally obtained credit even for the shrewdness and comprehensiveness of thinking, and the acute observation of life, which they really evinced: while his tendency to paradox in opinion, his oddity and clumsiness of language, and the coarseness with which his vigour of feeling was alloyed, had furnished topics of ridicule to some who thought his works worth criticising. It was particularly provoking to him, that not only his poetical efforts, but also his speculations on politics and society, should have been handled most severely in the 'Quarterly Review,' the literary organ of the party to which, although too independent and eccentric to be relied upon as a partisan, he always professed to belong.

He was hardly more successful in his next literary attempt, 'The Earthquake,' 3 vols. 12mo., 1820, a serious novel, marked by that clumsy and gloomy strength of feeling which pervaded his dramas. But he now hit upon the ground in which lay his strength, the delineation of familiar Scottish life, in his own inimitable vein of quaint, shrewd, homely, observant humour. In 1820 and 1821 his 'Ayrshire Legatees' appeared in successive numbers of 'Blackwood's Magazine;' and the work was immediately published separately. Its popularity encouraged him to a series of sketches similar in character. The next of these was 'The Annals of the Parish,' 1821; which, by the way, had been written several years before, and offered for publication to the bookseller Constable, who refused to venture on it. Then came the 'Provost,' 'The Steamboat,' and Sir Andrew Wyllie' (3 vols.), all in 1822; and 'The Gathering of the West,' 1823. After this he was tempted to desert his own peculiar path, by his incessant hankering after more ambitious themes and more ele-

been deficient not only in commercial cau
ference both to the provincial government an
ers at home; and he himself always mai
colonial authorities were prejudiced against hi
by misrepresentations of the tenor of his
The governor, Sir Peregrine Maitland, sent
against him; alarm was excited about the C
and the directors superseded him. He return
the spring of 1829, after a residence of about
half. Soon afterwards, being pressed by s
tors, he took the benefit of the Insolvent De

After this unfortunate catastrophe, Mr.
years old, did not again make any sustained att
mercantile occupation. The embarrassme
forced him upon authorship for the subsisten
his family; and, although he was not able
work comparable to the few which had g
literary celebrity, the circumstances in whi
were made were such as to render his active
meritorious and touching. His earliest wor
were his novels of 'Lawrie Todd' and 'Sout
caustic 'Life of Lord Byron,' 1830. Whil
of these he undertook the editorship of the
paper, which however he very speedily resig
now broke up rapidly. He had already had
paralysis; a second occurred soon after his
the newspaper. But his literary exertions
laxed, unless for a short time, when he atte
tion of a new American Land Company.

About midsummer, 1832, paralysis recurre
violence; and from that time he was a confi
retired to Scotland, where repeated attacks
body an utter wreck, but with surprisingly l
courage or on the vigour of his intellect.
much, but his invention was active to the las
to dictate his compositions to a young am
friend who happened to visit him, long after
of every limb. Volume after volume, so co
mitted to the press, as he himself said,
from famine,' ought to receive, not the unfav
merited by unavoidable defects, but the c
bearance due to the manly fortitude of the
Among these fruits of decay, there were
novels and tales, and contributions to perio
which give, in a very incomplete and disjo
information about his life and writings: 'Th
of John Galt,' 2 vols. 8vo., 1833; and 'T
and Miscellanies of John Galt,' 3 vols. 12m

heath or moor game, black game, and bustards. Snipe,
ndrail, woodcock, and conies are not game, but they
be taken or killed by certificated persons.
cocks and snipes may be taken with nets or snares,
rabbits, by the proprietor, in an enclosed ground, or
ant and his servant.
alty not exceeding 2*l*. over and above the value of the
ncurred for killing, wounding, or taking any house-
pigeon when the offence does not amount to a larceny
Geo. IV. c. 29).
person who purchases a certificate or licence may kill
on his own land, or on the land of any other person
s permission. This important alteration of the law
cted by 2 Wm. IV. c. 32, before which time a person
aired to be possessed of a qualification by estate or
entitle him to kill game. The statute 13 Richard II.
e title of which was, 'None shall hunt but they who
ufficient living,' was the first introduction of a quali-
to kill game. This statute prohibited laymen who
lands or tenement of 40*s*. a year, and priests who had
a year, from taking or destroying deer, hares, or
upon pain of one year's imprisonment. By 3 Jac. I.
he qualification to kill game was increased to 40*l*. a
land and 200*l*. in personal property. By 22 & 23
c. 25, the qualification was limited to persons who
estate of inheritance of 100*l*. per annum or an estate
n of life or 99 years, or upwards of 150*l*. annual value.
s Blackstone remarks, there was 'fifty times the
ty required to enable a man to kill a partridge, as to
r a knight of the shire.' Qualifications were also of a
l nature, as being the son and heir apparent of an
. Persons who had not these qualifications were not
l to have or keep game dogs.
ificates were first required to be taken out by persons
d to kill game by the act 25 Geo. III. c. 50. The
ate itself, which costs 3*l*. 13*s*. 6*d*., now gives a qualifi-
It must be taken out annually, and expires in July.
tsman who refuses to show his certificate when de-
l by collectors of taxes, gamekeepers, landlords, occu-
nd lessees, is liable to a penalty of 20*l*. Uncertifi-
ersons who kill or take any game, or who use any dog,
c. for the purpose of searching for or killing or taking
are liable, on conviction before two justices, to a penalty
eeding 5*l*. for each offence, with additional penalties
the Certificate Act of 23*l*. 13*s*. 6*d*. Penalties under
Wm. IV. c. 32 are given to the parish, to be applied in
the county-rate, and in some cases a portion of the
goes to the informer.
right which a certificate gives to kill game is subject
mber of restrictions. A certificated person is liable to
ty of 5*l*., with costs, for taking or killing game on
or Christmas-day, and to a penalty not exceeding 20*s*.
h head of game taken or killed at the season when the
of each kind of game is prohibited. He is subject to
eral law of trespass for going upon another person's
The right to the game is vested by 1 & 2 Wm. IV.
n the tenant in all cases where it is not reserved to the
in his agreement with the tenant; but the game
rally coveted by the landlord, and few tenants are in
ion to oppose their landlord. The consequence is
game is reserved by the landlord when he lets his
d when this is the case, the occupier can neither kill
r give permission to another person to do so. He is
nder 1 & 2 Wm. IV. c. 32, to a penalty of 20*s*., with
r every head of game killed by him or other persons
ed by him. When the landlord reserves the game, he
l it on the tenant's land, or authorize any certificated
to enter on the land and kill the game. The tenant
l woodcocks, snipes, quails, landrails, or rabbits, on the
hich he occupies, but he cannot authorize other persons
hem. The person who has the right of killing the game,
occupier of the land, or gamekeepers, or any person
zed by either of them, may require a person found tres-
in pursuit of game to quit the land, and to give his
nd place of abode; and in case of refusal, the tres-
may be taken instantly before a magistrate, who may
n 5*l*.; but if not brought before a magistrate within
hours, proceedings must be taken by summons or war-
If five or more persons together trespass in pursuit of
and any one of them be armed with a gun, and if
or violence are used to prevent any authorized person
pproaching them for the purpose of requiring them to
e land, or to tell their names and abodes, every person
so offending is liable to a penalty not exceeding 5*l*.. in addition to any other penalty with costs.

The law is very severe against persons not authorized, who take or destroy game by night. By 1 & 2 Wm. IV. c. 32, 'day-time' is to be deemed from one hour before sun-rise to one hour after sun-set. The 9 Geo. IV. c. 69, enacts, that if any person by night shall take or kill game or rabbits on any land, or shall enter therein with gun, net, engine, or other instrument, for the purpose, he shall, on conviction before two justices, be committed to hard labour in the house of correction for a term not exceeding three months, and, at the expiration of that period, find securities for twelve months, himself in 10*l*. and two others in 5*l*. each, or one security in 10*l*. In case of not finding sureties (and it is not a likely case that night-poachers should be able to find them), the offender may be further imprisoned six months. For a second offence the term of imprisonment is extended to six months, the sureties are doubled, and required for a period of two years. If the offender cannot find sureties, he may be further imprisoned for twelve months. The third offence is punishable with transportation for seven years, or imprisonment with hard labour in the house of correction for a term not exceeding two years. Offenders under this act may be apprehended on the spot by owners and occupiers of lands, their servants and assistants; and if they assault or offer violence with gun, club, stick, or otherwise, they are liable to be transported for seven years, or to be imprisoned with hard labour for two years. The punishment for night-poaching is still more severe when three or more persons enter any land for the purpose of taking or destroying game or rabbits, armed with a gun, bludgeon, or other offensive weapon, and they are subject to transportation for a period not exceeding fourteen years, or to imprisonment with hard labour for not exceeding three years. In 1844 an act was passed (7 & 8 Vict. c. 29) which extended the provisions of 9 Geo. IV. c. 69, against night-poaching to persons who take or kill game or rabbits upon public roads or highways, and other roads and paths leading to enclosed gates, and also at the gates, outlets, and openings between such lands and roads or paths.

By s. 36 of 1 & 2 Wm. IV. c. 32, it is enacted, that if any unauthorized person be found by day or night on any land in search of game, and have in his possession any game which 'appears to have been recently killed,' any authorized persons, as gamekeepers, occupiers, or others who have the right of killing the game, may demand such game and seize it if not immediately delivered.

A penalty not exceeding 10*l*. is incurred for laying poison with intent to destroy game (1 & 2 Wm. IV. c. 32).

If any person who is not authorized to kill game himself, or who has not permission from a person who has such right, shall take out of the nest or destroy the eggs of any bird of game, or of any swan, wild duck, teal, or widgeon, or shall knowingly have in his possession any such eggs so taken, he shall be liable on conviction to a penalty not exceeding 5*s*., with costs, for each egg (1 & 2 Wm. IV. c. 32, § 24).

By the act 7 & 8 Geo. IV. c. 29, it is felony to course, hunt, snare, carry away, kill or wound, or attempt to kill or wound, any deer kept in any inclosed land, whether forest, chace, or purlieu, or other place wherein deer is usually kept. The punishment is transportation for seven years, or imprisonment for two years. If the offence be committed in the uninclosed part of a forest, chace, &c., the penalty for the first offence is a sum not exceeding 50*l*.; and for a second offence, transportation or imprisonment.

Such are the principal legal provisions respecting game which exist at the present day. This right of appointing persons called gamekeepers, who are, properly speaking, a game police, does not belong to all owners of lands. Gamekeepers were first allowed to be appointed by 22 & 23 Car. II. c. 25. Before the act 1 & 2 Wm. IV. c. 32 was passed, a person could only appoint one gamekeeper. By this act lords of manors may appoint one or more gamekeepers to preserve or kill game within the manor for their own use. Lords of manors may depute any person to be a gamekeeper to a manor, with authority to kill game for his own use or that of any other person named in the deputation. The gamekeepers are authorized to seize all dogs, nets, and other engines used for killing game by uncertificated persons.

Until the passing of the act 1 & 2 Wm. IV. c. 32, no person was allowed to sell game; but it was made saleable by this act, as the law was systematically evaded. A dealer in game must obtain an annual licence from the justices, who hold a special session in July for the purpose of granting such licences. Innkeepers, victuallers, retail beer-sellers, guards, coachmen, carriers or higglers, or persons in the employ of any of these classes of persons, are prohibited from dealing in game. Licensed dealers who buy game of any person not authorized to sell it are liable to a penalty of 10*l.* with costs. A person not being licensed, who buys game of an unlicensed person, subjects himself to a penalty not exceeding 5*l.* for each head of game, with costs.

The preservation of game is an object of constant solicitude to nearly all those who belong to the landed gentry in this country. The pursuit of game is not only followed for the sport which it affords, but because ideas derived from the feudal times still attach a social distinction to the right of killing birds and beasts of game. It is only fifteen years since this privilege was acquired only by property or birth. It is still sufficiently restricted to confer upon those who enjoy it a petty importance. Within the last fifty years game has been preserved to an excess which was previously unknown. Most of the laws relating to game which have been passed within this period have been made to enable game-preservers to indulge in this taste, and to visit with greater severity those who are tempted by the abundance of game to become poachers. The accumulation of game in preserves, watched and guarded by numerous keepers, has led to changes in the modes of sporting. The sportsman of the old school was contented with a little spoil, but found enjoyment in healthful recreation and exercise, and was aided by the sagacity of his dogs. In the modern system of battue-shooting, the woods and plantations are beaten by men and boys; attendants load the sportsman's guns, and the game is driven within reach of gun-shot, and many hundred heads of game are slaughtered in a few hours. The true sportsman would as soon think of spoiling a poultry-yard. Battue-shooting is the end of excessive game-preserving; and in this so-called sport, members of the royal family, ministers of state, and many of the aristocracy eagerly participate. In an ordinary day's sport of this description, seven or eight hundred head of game may be killed by three or four sportsmen in about four hours, and perhaps fifty or sixty wounded may be picked up on the following day. A couple of gentlemen may kill nine hundred hares in one day. On a great field-day, when the sportsmen are more numerous, the slaughter is immense. Whole waggon-loads of hares are sent off to the London and other great markets for sale, as the result of one day's sport.

The effect of protecting game by oppressive laws is, perhaps, more injurious to the morals of the rural population than any other single cause. With a densely crowded population, thousands of whom are often pressed by hunger, and frequently in a state of the most lamentable poverty, the temptation to kill game is irresistible. It swarms before the labourer as he returns home in the evening from his long day of hard toil. *He* does not recognise property in game. No man can claim an individual hare or partridge like an ox or a sheep. The latter must be fed at the expense of their owners; but game is fed by no one in particular. This man, then, who probably would not, for all his poverty, violate the laws of property in the case of poultry, and who at the bottom recognises no greater right of property in a partridge than in a sparrow, sets a snare in the haunts frequented by game near his cottage, and is pounced upon by the keeper. When he comes out of the gaol, the farmers perhaps dare not employ him lest they should offend the game-preservers their landlords. The justice and the rural police look upon the gaol-bird with suspicion; and only at the beer-shop, with men of his own stamp and character, does he feel at home. It is hardly necessary to sketch his further progress. In nine cases out of ten, it is from bad to worse; and this because for objects of selfish gratification men have given to a bird or beast of little worth in itself an arbitrary value, and protected it by statutory regulations stricter than are applied to many other things which are recognised as objects of property by all mankind.

The number of persons convicted at assizes and sessions in 1843, for infractions of the game-laws in England and Wales, was 4529, of whom 40 were transported. Between 1833 and 1844 there were 41 inquests on gamekeepers found dead, and in 26 cases verdicts of wilful murder were returned. In 1843, out of 201 persons summarily convicted in Bedfordshire, 143 were committed for poaching, and sentenced to prison for an average period of seven weeks each. In the same year, out of 539 persons committed to the county gaol for Buckinghamshire, 169 were for offences against the game-laws. The wives and families of these men must be maintained during the husbands' imprisonment; and hence the poor-rates and the county-rates are at the same time increased. Gaols require to be enlarged; and as poaching leads to other crimes, a more extensive police is required for the protection of property. The time of this force is not a little taken up in preventing, detecting, and apprehending poachers. The game-laws are in this way a heavy burden on the occupiers of land.

The total public expenditure which the preservation of game occasions is probably more onerous than that which is required for the support of pauperism in this country. Game and the game-laws, are among the greatest hindrances to the improvement of agriculture. They not only prevent a gain, but they occasion a loss to the actual aggregate of agricultural produce.

Many landowners in their enthusiasm respecting game take means to ensure its preservation which none but tenants in a wretched state of dependence would submit to. The tenant is not allowed to use his best skill in the application of his own capital to the land, but is interfered with on account of the game. This game devours the produce of the land, is fattened at the tenant's expense (compensation for the destructiveness of game being generally futile and illusory), and the landlord pockets the money which the game thus fed produces in the market. The effect would be far less injurious if the landlord turned a certain proportion of his oxen and sheep to feed with those which belong to his tenants. There are instances where the landlord lets the game on the tenant's land to a third person, and thus gets two rents, one for the land and another rent for the game after it has been fed by the farmer.

It has often been stated that from three to five hares eat and destroy as much as would keep one sheep. On many farms the number of hares averages at least two per acre, and the destruction by hares alone is often equal to an additional rental of 10*s.* per acre on the whole of the farm: there is, besides, the waste and destruction caused by rabbits, pheasants, and partridges. On some farms of 500 acres where the game is strictly preserved, but not excessively, the loss caused by hares will often amount to above 200*l.* The landlord sells the hares at perhaps 1*s.* 6*d.* each, and pockets 75*l.* This is short-sighted enough, setting aside the bad moral effect of the practice. The operations of the poacher, if he escape detection, are in one sense beneficial to the tenant-farmer, for the destruction of the game adds to the farmer's profit; but if the poacher be convicted and sent to gaol, then the support of the man and his family adds to the loss which the game occasions.

Many of the reservations and covenants in leases in relation to game are fit only for the copyholders of a manor four or five centuries ago. There are many farms on which the tenants are forbidden either to mow wheat or drill turnips. Mowing costs less than reaping, and the tenant has besides the advantage of an extra quantity of straw for the stock and for manure; but then the ground is left too bare to shelter the partridges, and therefore the scythe must not be used, nor any other instrument which cuts lower than twelve inches. Drilling turnips is now an essential operation in all good systems of farming; but though it gives a much greater weight of roots per acre, it encourages the birds to run, and spoils sport. In some districts, where game is preserved with great strictness, a farmer is not allowed to sow winter tares. To drain land where rabbits are kept would be a waste of property. Legislation cannot produce any improvement in this state of things. It arises from the dependent condition of the great majority of the tenant-farmers; and if a law were passed which gave them the right to kill the game on their lands, it would be of no advantage to them. The gamekeepers and other retainers of the great and small game-preservers are spies on the tenant, and in the intense competition for farms he dare not contravene the wishes of his landlord. Public opinion may and does produce some effect on the landlord's exercise of his power, but this is confined to isolated cases.

The administration of the game-laws in England is in the hands of persons who are either game-preservers themselves, or who, generally speaking, are not unfavourable to the system, and hence the rigour with which offences against the law are visited. Before the act 1 & 2 Wm. IV. c. 32 was passed, penalties for infractions of the game-laws could be recovered before one justice; but now conviction can only take place before two justices, and an appeal lies to the quarter-sessions, but a certiorari is not allowed. There was no appeal formerly, and great obstacles were thrown in the way of obtaining a certiorari. The expenses of appeal are heavy.

On the 27th of February, 1845, on the motion of Mr.

P. for Durham, a select committee was appointed
nto the operation of the game-laws. At the close
on the committee reported that they had not con-
r inquiry, and it is to be resumed in the session of
rtain members of the committee voted against
e evidence already taken, and when Mr. Bright,
ven notice of his intention, was about to bring the
fore the House, the House was counted out. The
nnot therefore be printed before 1846.

ber of certificates taken out annually to kill game
000 in Great Britain, and the number of licences
e about 800.

countries, as well as in England, game-laws have
trument of oppression. In France before the first
there were edicts for preserving game which 'pro-
eding and hoeing, lest the young partridges should
d; steeping seed, lest it should injure the game;
with night-soil, lest the flavour of the partridges
njured by feeding on the corn so produced; mow-
. before a certain time, so late as to spoil many
taking away the stubble which would deprive the
elter.' (Arthur Young's *Travels in France in*
.) The tyranny of the manorial courts rendered
to escape from this oppressive system. The Con-
sembly abolished this exclusive 'droit de la chasse'
seigneurs arrogated to themselves. A stringent
as recently been enacted in France, which is giving
ce.

NG. [Gaming or Gambling, P. C.] In Eng-
e the passing of 8 & 9 Vict. c. 109, the law consi-
rs in general as legal contracts, and the winner of
ld enforce his claim in a court of law. The ex-
this rule were, where the wager was an incitement
of the peace or to immorality; where it affected
s or interests of third persons, or exposed them to
inconvenience; or where it was against sound
prohibited by statutory enactment. In cases not
ded within the above exceptions the judges fre-
fused to try actions respecting wagers when they
the matter to be of a frivolous or of an improper

land the courts followed an opposite rule to that
vailed in England. They held that 'they were
to try adverse rights, and not to determine silly or
t doubts or inquiries of persons not interested in the
question;' and they decided 'that their proper
re to enforce the rights of parties arising out of
nsactions, and not to pay regard to *Sponsiones*

a select committee of the House of Commons on
commended that 'wagering in general should be
bject to no penalty;' and they also expressed an
favour of the law of England being assimilated to
tland.

session of 1845 the act 8 & 9 Vict. c. 109 was
ich enacts 'That all contracts or agreements,
y parole or in writing, by way of gaming or wager-
e null and void; and that no suit shall be brought
ed in any court of law or equity for recovering any
ney or valuable thing alleged to be won upon any
which shall have been deposited in the hands of
to abide the event on which any wager shall have
: provided always, that this enactment shall not
to apply to any subscription or contribution, or
to subscribe or contribute, for or toward any plate,
m of money to be awarded to the winner or win-
lawful game, sport, pastime, or exercise.'

Charles II. c. 7, any person who won any sum of
fraud, cosenage, or deceit was to forfeit treble the
Under 8 & 9 Vict. c. 109, cheating at play is to
d as obtaining money under false pretences.

16 Charles II. c. 7, which was designed to repress
aming by restraining it to playing for ready money,
by 8 & 9 Vict. c. 109.

use in 13 Geo. II. c. 19, which enacted that no
shall be run for any prize less than 50*l*. in value,
d by 3 & 4 Vict. c. 5.

vision of the statute of Anne against bets exceeding
much a dead letter, that its existence appears to have
t forgotten, until in 1843 a number of actions were
common informers against several noblemen and
who had violated the law by betting sums of more
horse-races. A bill was brought in early in the session of 1844, for the relief of these persons, and was rapidly passed through its several stages. The act is 7 Vict. c. 3, and it was entitled 'An Act to stay proceedings for three calendar months, and till the end of the present session of Parliament, in certain actions under the provisions of several statutes for the prevention of excessive gaming, and to prevent any proceedings being taken under those statutes during such limited time.' Select committees were appointed in both Houses of Parliament to inquire into the laws respecting gaming, and another act (7 Vict. c. 7) was passed to indemnify witnesses implicated in gaming transactions who should give evidence before these committees. Before the session was over, and to prevent the consequences of the act 7 Vict. c. 3 being allowed to expire, another act was passed (7 & 8 Vict. c. 58) which further stayed proceedings in the actions for gaming.

The act 8 & 9 Vict. c. 109 repeals those parts of 9 Anne c. 14, and 18 Geo. II. c. 34, which rendered it illegal to win or lose any sum exceeding 10*l*. at play or by betting; and there is a clause under which all actions and informations commenced previous to this act under former statutes against gaming are to be discontinued on payment of costs.

The act 7 Geo. II. c. 8, which was made perpetual by 10 Geo. II. c. 8, entitled 'An Act to prevent the infamous practice of stock-jobbing,' is violated hourly on the London Stock-Exchange by the practice of time-bargains.

The acts 19 Geo. II. c. 37, and 14 Geo. III. c. 48, are intended to prevent transactions of the nature of gaming or wagering on policies of marine and life insurance.

The act 8 & 9 Vict. c. 109 greatly facilitates proceedings against any common gaming-house, by enacting that in default of other evidence it shall be sufficient to prove that such house or place is kept or used for playing therein at any unlawful game, and that a bank is kept there by one or more of the players exclusively of the others, or that the chances of any game played therein are not alike favourable to all the players, including among the players the banker or other person by whom the game is managed, or against whom the other players stake, play, or bet; and every such house or place shall be deemed a common gaming-house. It is not necessary under this act to prove that any person found playing at any game was playing for any money, wager, or stake. The act dispenses with the necessity of obtaining the allegation of two householders that any house is a common gaming-house; and provides, that on the report of a superintendent of metropolitan police, it shall be lawful for either of the commissioners of police to authorize the superintendent by a written order to enter any house or room with constables, and, if necessary, to use force for the purpose of effecting such entry, whether by breaking open doors or otherwise, and to take into custody all persons who shall be found therein, and to seize and destroy all tables and instruments of gaming found in such house or premises, and also to seize all money and securities for money found therein. If any cards, dice, balls, counters, tables, or other instruments of gaming used in playing any unlawful game be found in any house or room which the police have entered as a suspected gaming-house, or about the person of any of those who shall be found therein, it shall be evidence, until the contrary be made to appear, that such house or room is used as a common gaming-house, and that the persons found in the room where such instruments of gaming shall have been found, were playing therein, although no playing was actually going on in the presence of those who made the entry. Before this act was passed, persons found in a gaming-house could not be searched; and proof of play was necessary before entry. In all other places out of the metropolitan police district the justices may by warrant empower constables to enter gaming-houses. Persons who have been concerned in unlawful gaming and who give evidence on the trial of any owner or keeper or person who has had the management of a common gaming-house, may obtain a certificate from the magistrate or judge of the court, which frees them from all criminal prosecutions, penalties, &c.

The punishment which may be inflicted on gaming-house keepers under 8 & 9 Vict. c. 109, in addition to the penalties mentioned in 33 Hen. VIII. c. 9, is, a penalty not exceeding 100*l*., or imprisonment with or without hard labour for a term not exceeding six months.

By 8 & 9 Vict. c. 109, public billiard and bagatelle boards are not to be kept without a licence, and the places where they are kept may be visited at any time by constables and officers of police; and such places are to be closed entirely on

Sundays, and on other days at midnight, except Saturday, when the hour of closing is fixed at eleven o'clock.

On the night of the 8th of May, 1844, a simultaneous entry was made by the police into all the common gambling-houses, seventeen in number, which were then known to exist in the metropolitan police district. Gambling is also carried on in the metropolis at places where billiard-tables are kept, at public-houses, and also at cigar-shops. The evidence taken before the select committees on gaming in 1844 contains a mass of information on the subject of gaming and gambling both in London and elsewhere.

Gaming (alea) among the Romans was played with dice. The earliest enactment against it is referred to by Plautus and Cicero; but it is not certain what the penalty was. Under the later republic and the empire gaming was a common vice, but it was considered to be disreputable. The little that is known of the penalties against gaming is contained in the Digest (11, tit. 5) and the code of Justinian (iii. tit. 43). The praetor in this, as in many like cases, placed the encourager of gaming under disabilities. If a man lent his house for gaming, and, while the gaming was going on there, was beaten or had anything stolen from his house, the praetor refused him all remedy. A senatusconsultum, the name and time of which are not mentioned, prohibited all playing for money, except the stake was made upon the five athletic exercises enumerated, and, as we must infer, by the persons who joined in the exercises. If a slave, or a son in the power of his father, lost money at gaming, the father or owner of the slave might recover it. If a slave won money, there might be an action for it against the master; but the demand against the master could not exceed the amount of the slave's peculium, that is, the property which the slave held as his own, according to Roman custom, with the permission of his master. The praetor's edict also allowed an action against parents and patrons in respect of money lost (to children or the patrons' freedmen, as we must understand it). Justinian made several constitutions against gaming. A man who lost money at gaming was not bound to pay it; and if he did pay, it could be recovered by him or his successors (in the Roman sense) from the winner or his heredes any time within thirty years. If they did not choose to recover it, the father or defender (defensor) of the town in which the money was lost might recover it, or any other person might. The money, when recovered, was laid out for public purposes. Gamblers were also liable to a fine. Spiritual persons who violated the gaming laws, or were present at gambling, were suspended for three years and confined in a monastery (*Novell.* 123, c. 10).

The following abstracts of the laws relating to gaming in different countries were prepared by J. M. Ludlow, Esq., and were laid before the Select Committee of the House of Commons on gaming, by H. Bellenden Ker, Esq.:—

By the French law, as it stood before the Revolution, minors alone could recover their losses at play; but no winnings could be sued for except in the case of warlike sports; when not excessive, games of strength and skill were permitted, games of mere chance absolutely forbidden.

The Code Français allows an action for money won at games of strength and skill, when the amount is not excessive; but money paid can never be recovered, unless on the ground of fraud. The keepers of gaming-houses, their managers or agents, are punishable with fine (100 to 6000 francs), and imprisonment (two to six months), and may be deprived of most of their civil rights. A trifling fine is imposed on those who set up lotteries, or games of chance in public places; the furniture, implements, &c. are in all cases to be seized.

By the Prussian Code all games of chance, except when licensed by the state, are prohibited. Gaming debts are not the subject of action; but money paid cannot be sued for by the loser. Wagers give a right of action when the stakes are constituted in cash in the hands of a third person; they are void when the winner had a knowledge of the event, and concealed it. Money lent for gambling or betting purposes, or to pay gambling or betting debts, cannot be sued for. Gaming-house keepers are punishable with fine, professed gamblers with banishment; and if they break the ban, by imprisonment. Occasional cheating at play obliges to compensation; professed swindlers at play are punishable as for theft, and banished afterwards. Money won from a drunken man, if to a considerale amount, must be returned, and a fine paid of equal value.

In Austria no right of action is given either to winner or loser. All games of chance are prohibited, except when licensed by the state. Cheating at play is punishable with imprisonment, according to the amount of fraudulent gain. Playing at unlawful games, or allowing such to take place in one's house, subjects the party to a heavy fine, or in default to imprisonment.

The provisions of the Sardinian civil code are similar to those of the French, giving an action for money won at games of strength or skill, when not excessive in amount, but not allowing the recovery of money lost, except on the ground of fraud or minority (a provision taken from the old French law).

The Bavarian code is somewhat special in its [illegible] it distinguishes between games of pure skill, and [illegible] and chance on the one hand, and games of mere chance on the other. In the two former, money honestly won, if not excessive in amount, may be lawfully claimed, and money lost cannot be recovered; but with respect to fraudulent or excessive gaming, and also as to all games of mere chance, the winner may be called upon to repay his gain, and is liable, together with the loser (except as to the latter in the case of fraud), to a penalty of varying amount. Gaming-house keepers and professed gamblers are subjected to heavier penalties. Distinctions are also taken as to wagers, which are only void for fraud or immorality, but the amount of which is liable to be reduced, if excessive. When money lost at play is proved to have been the property of some other person than the player, the true owner may recover it.

Wagers also appear to be lawful in Spain, when not themselves fraudulent, or relating to anything unlawful or immoral. (Johnson's *Institutes of the Civil Law of Spain*, p. 242.)

GANDON, JAMES. Of this eminent architect [illegible] escaped the notice of the industrious Nagler) nothing [illegible] as to either his parentage or the place or year of [illegible] and we can only infer from the date of his death [illegible] of eighty-two, that he must have been born about [illegible] He studied under Sir William Chambers, and was the [illegible] who obtained the gold medal for architecture at the [illegible] Academy, on which occasion Reynolds is said to [illegible] plimented him, and to have predicted his future fame. [illegible] began to make himself known in his profession by [illegible] ing a continuation of Campbell's 'Vitruvius Britannicus,' [illegible] first volume of which, or fourth of the series, [illegible] 1767, and the second in 1771. Though he had Woolfe for his coadjutor in the work, Gandon appears to have taken the chief share of the management and editorship upon himself, and in fact the name of John Woolfe would not now be known but for its association with that of Gandon, and for a strange mistake which has attributed to him a building that appears to have been by some other architect. Though Dallaway, and others after him, say that Woolfe built 'Lord Shrewsbury's, at Heythrop,' the 'Vitruvius Britannicus' itself contradicts this, for there Woolfe's name appears only as that of the draftsman of the two plates of the mansion at Heythrop, as do both his and Gandon's to many other subjects whose authors are expressly mentioned. If Woolfe really built Heythrop, it is most singular, especially as he was one of the editors of the 'Vitruvius,' that that fact should not have been distinctly stated in the letter-press account of that subject; besides which the building itself (destroyed by fire in 1831) by no means favours the supposition of its having been erected [illegible] Woolfe's time, since it is in a style that savours far more of the commencement than the middle of the eighteenth century; and at any rate the taste displayed in it would hardly entitle Woolfe to the epithet of a 'classical' architect, even were his claims to the authorship of the design undeniable. That he was not the architect of Heythrop may further be presumed from there being merely a single plan and elevation of that building, although a section of it—which, had he been the actual architect of it, he could easily have furnished—was almost indispensable for explaining some parts of the internal plan, in which there is more variety than usual. In fact, the 'Vitruvius' is sadly deficient in regard to sections, only a very few of the subjects being so illustrated; and although the continuation exhibits a decided improvement upon the original volumes by Campbell, it leaves great room for further improvement: while many buildings of considerable interest are omitted, several are given which possess very little interest or merit; neither does the letter-press afford that information—easily given at the time—as to dates, architects, and other particulars, which would now be valuable. So far from being descriptive and explanatory of the respective buildings, the letter-press, which appears to have been written by Gandon

and which certainly does not say much for his lite-
lities, tells us very little more than what may be made
the plates themselves. Even as an architect Gandon
appear to any particular advantage in the 'Vitruvius,'
rt-hall' at Nottingham (vol. v.) being of rather nega-
rit, though Dallaway calls it 'a most correct and
lesign of the Ionic order,' whereas, so far from being
specimen, the entablature would accord with Tuscan
just as well as or better than with Ionic ones. Gan-
self however tells us that he made five different
for that building, and that he was obliged to pare
is ideas to suit the notions and the frugality of his
rs; yet the plan and section of the original design,
e has given along with the other plates, do not dis-
y extraordinary talent. Still his building at Not-
obtained for him the notice of Sir George Saville,
the poet, and other persons of distinction, and pro-
rought him professional employment, as he discon-
e 'Vitruvius,' after the second supplementary volume;
the work since been resumed by other editors. G.
son's 'New Vitruvius Britannicus' is a mere collec-
plans and elevations, for the greater part of no archi-
interest or merit, and unaccompanied by any letter-
and F. P. Robinson's work, which has a similar title,
un upon such a scale as was more suitable for a series
ct publications on the respective buildings than for a
e one.

aying so much on the subject of the 'Vitruvius' we
excused, since it is with that work that Gandon's
most familiarly associated in this country; whereas
itectural talents found a field opened to them in Ire-
On premiums being offered by advertisement for the
sign for a Royal Exchange at Dublin, Gandon's ob-
he second and those by Cooley [Cooley, P. C. S.]
omas Sandby the first and second prizes. What
's design was is not known, but its merits attracted the
of the Earl of Charlemont, Colonel Burton Conyng-
d other admirers and patrons of art. Nor was it long
n opportunity presented itself in the Irish capital very
eding the Exchange both in magnitude and import-
The Custom-house of Dublin, a magnificent pile of 375
feet (begun in 1781 and finished 1791), is one of the
structures of the kind in the world—perhaps the
of all—and would of itself alone suffice for the fame
rchitect. Dublin is also indebted to him for several
of its finest buildings,—the eastern front and Corin-
rtico of the House of Lords, now the Bank of Ireland;
r Courts (begun by Cooley, but completed by him,
eat alterations from the original design), and the
Inns. He also built the Court-house at Waterford,
bably many other things besides, although they have
ained distinct notice. It is to be regretted that
did not perform for himself and his own works the
ice as he had in the earlier part of his life done for
other architects; and that he did not bequeath us such
iography of his professional career. But architects
are to be autobiographers nor are they hardly ever
bjects of biography. Gandon died at Cannonbrook,
an, Ireland, at the beginning of 1824.

ODUS, a genus of fossil Ganoid Fishes, from the
Stonesfield; seven species (Egerton); referred to
by Agassiz.

OID, a grand division of fossil fishes in the classi-
of M. Agassiz. [Fishes, Fossil, P. C. S.]

S, EDWARD, was born at Berlin on the 22nd of
1798, and descended from Jewish parents of great
bility. His father was a wealthy man, noted for his
wit, and highly esteemed for his patriotism: he
the particular confidence of the Prussian state chan-
the Baron (afterwards Prince) Hardenberg. After
been educated at the gymnasium called 'das Graue
' (the Grey Cloister), in his native town, Gans en-
e University of Berlin, in 1816, as a student of law.
ollowing year he went to Göttingen, and there, at the
ineteen, obtained the prize for the best answer to the
proposed by the faculty of law on the history and
l and political laws of the island of Rhodes: the dis-
n which he wrote on the subject was printed at the
of the faculty. In 1818 he left Göttingen, and went
lelberg, where he enjoyed the friendship and esteem of
, the jurist, and Hegel, the philosopher, and his inter-
with these celebrated men had a lasting influence on his
pursuits. At Heidelberg he wrote several articles for the 'Civilistisches Archiv,' edited by Gensler, Thibaut, and Mittermaier; and the 'Zeitschrift für die Wissenschaft des Judenthums,' in which he gave eminent proofs of his talents and learning. He took the degree of doctor in law in 1819, in the same university, and there also published a little work 'Ueber Römisches Obligationen-Recht.'

In 1820 Gans returned to Berlin, was admitted by the university as public lecturer on law (privatim docens, rather a strange name for a public lecturer), and in the same year published a work which created general sensation, namely, 'Scholien zum Gajus.' The first complete edition of Gaius, by Göschen, came only out in the following year, 1821, but the printing was begun as early as 1819: the printed sheets were distributed among the friends of the editor, and parts of the Institutes of Gaius had already appeared, and were commented upon in several learned Reviews in Germany. The first in rank among the earlier commentators were Savigny and Göschen, and it was principally against their opinions that Gans took the field in his 'Scholien.' He was rather rash in publishing his 'Observations' at so early a period, and on the whole the work is superficial; but it contains some profound remarks, and shows the solid knowledge which the youthful author had acquired of the historical part of the Roman Law. The learned public in general considered it a most valuable work, and they were certainly not wrong in judging it favourably. Until the discovery of the Institutes of Gaius, our knowledge of the history of the Roman law was very imperfect; and it is the merit of Gans that he was remarkably free from old errors, while he explained many new facts with extraordinary judgment: many comments on Gaius, however, which appeared after the Scholia, prove that it is easier to learn new truths than to forget old errors. Gans met, of course, with many distinguished opponents; and those who could not defeat him on the field of science traduced his character by styling his work the attempt of an insolent and self-conceited youth to overthrow the authority of his masters. Gans was not discouraged: he entered into a closer alliance with Hegel and Thibaut, who, with Feuerbach, Grollmann, and other distinguished jurists, were the originators of the school of philosophical jurisprudence, of which young Gans soon became one of the most eminent leaders. Their principal aim was, and still is, to explain the nature of law and its bearing upon the past as well as the future, through the medium of philosophical ideas, and to show its connexion with the moral, social, and political progress of mankind; and it cannot be denied that they exercised a beneficial influence upon legislation, the bar, and the judicature. Many of their followers however were misled by the influence of some favourite system of metaphysics; forgetting that every law is, or at least ought to be, the product of some national want, they published legal commentaries fit to puzzle at once the most plain and straight-forward judge and the most sophistical advocate; and it was apprehended that if they should ever obtain a complete ascendency over legislation, Germany would be blessed with a new edition of Plato's Republic, rather than with a new code and a constitution answering the wishes and the wants of the people. The historical school, on the contrary, cared little for the political or social progress of the people. Their attention was chiefly directed to the past; and, satisfied with having discovered the historical development of laws, they were prouder of having added to the knowledge of obsolete, forgotten, or obscure things than to the knowledge of modern law, however great might be its practical importance. Accustomed in their minute historical researches to see things grow gradually, they were puzzled whenever they met with great legislative revolutions, and they looked upon the present French code—that master-piece of modern legislation—as an 'unhistorical' product, and the same epithet they bestowed upon the modern constitutions of France, Spain, and Belgium. The philosophical school advocated the introduction into Germany of trial by jury in criminal cases, and publicity of proceeding in all cases: the historical school opposed them on the ground that such legal institutions had no connection with the present state of things; they proposed to introduce them first in trifling matters, in order that the people might accustom themselves to the novelty, and then to wait till the people would be 'ripe' for their general introduction. It was apprehended that, if the historical school should become the director of legislation, they would reduce Germany to slavery, since the feudal system, though oppressive, and the Justinian law, though the result of absolutism, were both regarded with favour by them as being completely developed 'historical' productions. On the whole, the philosophical school found more adherents among practical lawyers, and the historical school among learned lawyers, scholars, and antiquarians. Gans says, in the preface to his 'Das Erbrecht,' mentioned below, that the chief merit of the historical school consisted in having published excellent editions of the works of Roman jurists, and commentaries on obsolete laws.

Between the philosophical and the historical schools stood and still stands the school of positive jurisprudence, which comprehends all such jurists, mostly practical lawyers, as write on law with a practical view, the labours of the other two schools being rather of a theoretical character. One of the most distinguished positive jurists is Solomon Philip Gans, an advocate of the supreme court at Celle, in Hanover, who is still living, and the author of several excellent works and treatises on law, and who ought not to be confounded with his late kinsman Edward Gans. In the scientific struggle between the philosophical and the historical school Edward Gans was better enabled to take a leading part, as he had a profound knowledge of the history of the Roman Law, combined the qualities of a scholar with those of an eloquent and acute advocate, and could consequently attack his opponents with success on the very field where they thought themselves invincible. His first attack, as already said, was contained in the Scholia to Gaius. The second was 'Das Erbrecht in weltgeschichtlicher Entwickelung,' Berlin, Stuttgart, and Tübingen, 4 vols. in 8vo., 1824—35 (The Law of Succession, its historical development, and its importance for the history of the world), by which he placed himself among the first jurists of Germany. In this splendid work the author treats on the law of succession of the most eminent nations of the world, antient and modern, European, American, and Asiatic, even those of the Chinese, and shows how the alterations which the law has gradually undergone are combined with the history of the nations and their advance towards social and political perfection. A translation of this work would be a valuable addition to English literature; but the task is not easy, as it requires more than a superficial knowledge of the philosophy of Hegel, and the difficult art of rendering into English the technical terms of the most obscure of all German philosophers. In 1825 Gans was appointed professor extraordinarius, and some years afterwards professor ordinarius at the university of Berlin. The latter dignity is not bestowed upon Jews in Prussia, but Gans had adopted the Christian religion, at Hamburg, some time previous to his appointment. In 1826 he published 'System des Römischen Civil-Rechts' (System of the Roman Civil Law), and founded a new Review of which Berlin stood in great need, the 'Jahrbücher für wissenschaftliche Critik' (Year-Books for Scientific Criticism). After the outbreak of the French Revolution, in 1830, he went to France, a country which he had already visited previously, as well as England; and his fame being already established in France, he was well received by the most eminent men in Paris, among whom he preferred those who stood at the head of the great political movement. From France he went to England. The Prussian government now became suspicious, and set spies upon him, who reported every word they could catch. On his return to Berlin he began a course of lectures on modern history in the university, and his learning, eloquence, wit, and liberal principles attracted an immense crowd not only of students, who alone are entitled by law to attend the lectures delivered in the German universities, but of public functionaries, advocates, officers in the army, and others who endeavoured to get and actually got admission. He lectured in the largest room of the university, which was not only full to suffocation, but hundreds of gentlemen were seen standing outside, in the hall, and in the great court, in spite of a very severe winter (1832-33), and all eager to learn from their friends inside the subject of the lecture, or the spirited observations of the lecturer. This was a capital opportunity for the enemies of Gans to denounce him to the Prussian government as a demagogue; and after some time the government compelled him to give up his lectures, on the pretext that he being a professor of law had no right to deliver lectures on history. Little discouraged by this check, Gans introduced subjects connected with modern history into his lectures on law; and the Prussian government, dreading his sharp tongue as well as his principles, now commenced a system of annoyance and petty persecution against him, in which it was well assisted by the numerous enemies of the professor, and which embittered his life, and undoubtedly contributed to his untimely death. In the following years Gans published 'Vorlesungen über die Geschichte der letzten fünfzig Jahre' (Lectures on the history of the last fifty years), in Raumer's 'Historisches Taschenbuch' for 1833 and 1834; 'Vermischte Schriften juristischen, historischen, staatswissenschaftlichen und ästhetischen Inhalts' (Miscellaneous writings on jurisprudence, history, &c.), Berlin, 1834, 2 vols. 8vo.; 'Rückblicke auf Personen und Zustände' (Retrospective view of individuals and events), Berlin, 1836; 'Grundlage des Besitzes' (The Basis of Possession), Berlin, 1839, an attack upon Savigny's celebrated work on the Law of Possession among the Romans. Most of his time he devoted to a complete edition of the works of Hegel, those that were published already, and those which Hegel left partly unfinished in MS., especially on Hegel's Philosophy of History; and without Gans the world would perhaps never have seen a complete edition of Hegel, he being, according to Hegel's own words, the only man who thoroughly understood his great but obscure master. On the 1st of May, 1839, while dining with a friend, Gans fell suddenly speechless from his chair, being struck by apoplexy; after lingering a few days, he died on the 5th of the same month.

Gans was one of the most learned, most witty, and most eloquent men of Germany; distinguished as an author, and unsurpassed as a lecturer. His fame would have been still greater had he had an opportunity of displaying his talents on the political stage. No man was his equal in controversy: he confounded the most skilful of his adversaries by his sarcastic replies. Those whom he wounded deepest and spared least were men of acknowledged authority, or of high rank or birth, and among them he had his bitterest enemies. He belonged to those highly gifted Jews, his contemporaries, who held, or still hold, such an eminent rank among the learned, the poets, and the artists of Germany, as Heine the poet, Börne the political writer, Mendelsohn the composer, Michael Behr the poet, his brother Meier Behr, commonly called Meierbeer the composer, and many more. Gans's successor as professor of law in the university of Berlin was Dr. Stahl, a man of ultramonarchical principles, and a disciple of the notorious Haller, the author of the 'Restoration of Political Science.'

(*Neuer Nekrolog der Deutschen*; *Allgemeine Zeitung* (*Supplement*) of 1839, No. 132; *Conversations-Lexicon der Gegenwart*.)

GAOL. [TRANSPORTATION, P. C.]

GARDE'NIA (named after Dr. Alexander Garden of Charlestown, South Carolina, a correspondent of Linnæus), a genus of plants belonging to the natural order Cinchonaceæ. It has the calyx usually ribbed, with a tubular truncate limb divided into several lobes or teeth; the corolla funnel-shaped or approaching salver-shaped, with a tube much larger than the calyx, and a contorted spreading 5-9-parted limb; the anthers 5-9 linear sessile in the throat; the stigma clavate, bifid, or 2-toothed, with thick erect lobes; the dissepiments of the ovary 2-5, incompletely dividing it into cells: the berry fleshy, crowned with the calyx, with a papery or bony lining, incompletely 2-5-celled; the seeds immersed in fleshy parietal placentæ. The species are armed or unarmed trees or shrubs, with axillary or terminal, usually solitary, white and fragrant flowers.

G. campanulata is a shrubby plant with short branches spiny at the apex, the spines solitary; the leaves lanceolate, smooth, acuminated at both ends; the flowers on short pedicels in terminal and lateral fascicles; the limb of the calyx campanulate, with a short acutely 5-toothed border; the corolla sub-campanulate, 5-lobed; the berry roundish, ovate. This plant is a shrub 5 to 10 feet in height, and is a native of the East Indies, in the forests of Chittagong. The berry is about the size of a golden pippin apple, and is employed by the natives of India as a cathartic and anthelmintic.

G. arborea is an unarmed tree with ovate-oblong leaves, terminal, almost sessile flowers, usually arranged in threes; the corolla with a filiform tube and a 5-parted limb; the berry drupaceous, smooth, containing a 4-5-valved shell. It is a native of the East Indies. The fruit is eaten by the natives of India. It is one of the most beautiful species of the genus, and deserves a place in every collection.

There are about fifty species of Gardenia, which all bear elegant sweet-scented flowers. They thrive best in a mixture of loam, peat, and sand. Under the name of Cape Jasmines, double-flowered varieties of *G. florida* and *G. radicans* are extensively cultivated. Their flowers are very fragrant and the oest way of getting them to bloom freely is to set them in a close frame with a gentle bottom heat in the spring. In the

they may be placed in the greenhouse. They may
ased by cuttings.

dley, *Flora Medica*; Don, *Gardener's Dictionary*.)

RNISHEE. [ATTACHMENT, P. C.]

ROFALO, the name by which Benvenuto Tisio is
ly known, apparently from his adoption of a gilli-
garofalo) for his monogram. Garofalo is the most
ished of the Ferrarese painters; he belongs however
oman school. He was born in the Ferrarese in 1481,
first instructed in design by Domenico Pannetti, from
went to his uncle Niccolo Soriani at Cremona.
death of his uncle in 1499, he left Cremona and re-
500 to Rome, where he remained fifteen months
anni Baldini, and after visiting several other cities,
wo years with Lorenzo Costa at Mantua; he then
period of four years in Ferrara, and finally engaged
ith Raphael in Rome, in 1508 (1505 in Vasari is a
rint, as the stated intervals evidently show).

l's great powers and personal qualities excited in
as in other painters, a species of enthusiastic venera-
im; and Garofalo ever afterwards was a studious
f his style, even in his small works. He remained
s with Raphael in Rome, when he was called by
affairs to Ferrara. He intended to return to Raphael,
nstances kept him in Ferrara. He was employed
uardo and elsewhere on extensive works, together
two Dossi, by the Duke Alfonso I. He executed
cellent frescoes in Ferrara—the principal of which
se of San Francesco, the Slaughter of the In-
the Resurrection of Lazarus, and others, painted
19—24: they still exist. There are also some
frescoes by him still preserved in the Palazzo del
to. Garofalo's oil paintings are frequent in picture
: there are many at Rome, in the Borghese gallery,
e Ghigi and Doria palaces; and there are also some
cimens of his style in the galleries of Dresden and
sburg, and there are two small pictures of average
the National Gallery. His small pictures are very
s: he appears to have had a predilection for small pro-
; and with regard to these works, what Ælian (*Var.*
3) says of Dionysius of Colophon respecting Poly-
may be said of Garofalo respecting Raphael—he
his art in every respect except size. Garofalo how-
ough he imitated, did not equal Raphael even in
practice, except perhaps in colour. He is more in-
d more true in local tints than Raphael—his red and
aperies are remarkably pure, and are quite fresh even
ay—but in execution generally he is dry; his works
e in effect, and have much of the *quattrocentismo*, or
dity and dryness of design which characterise the
of the works of the fifteenth century. Though he
successful in the execution of the distinct objects or
of his works independently, he failed in uniting the
harmonizing the whole: he wants aerial perspective

He died in 1559, having been for the last few
is life quite blind.

i, *Vite de' Pittori*, &c.; Lanzi, *Storia Pittorica*, &c.)

YA, the only genus and type of the natural order
plete plants Garryaceæ. It was named by Mr.
n compliment to Nicholas Garry, Esq., secretary to
on's Bay Company. The flowers of this genus are
, the staminiferous and pistiliferous flowers being
tinct plants. The staminiferous flowers are in pen-
tkin-like racemes, within connate bracteæ. They
-leaved calyx and 4 stamens. The pistiliferous
e in pendulous racemes like the others, but with a
calyx, connate with the ovary, which is 1-celled.
e two setaceous styles, two pendulous ovules, with
s long as themselves. The fruit is a berried peri-
opening, and containing two seeds. The embryo is
ute in the base of a great mass of fleshy pulp. The
e simple, opposite, exstipulate, evergreen, serrated
. The species are shrubs, natives of California and

Only two species of this genus have been introduced
at Britain; they are very ornamental and grow best
y soil, and may be propagated by layers.

ptica, the Elliptic-leaved Garrya, has, when young,
escent, purplish branches; when older, they become
and greyish. The leaves are dark-green, shining
ary beneath, with simple, twisted, interwoven hairs.
ers are of a greenish or yellowish white, and are in
m November to February. Only the stamen-bear-
is in this country. During the season of blossoming this shrub presents a striking and beautiful appearance, with its delicate pendulous catkins, which are from eight inches to a foot in length. It is easily cultivated in our gardens and is as hardy as the common laurustinus.

G. laurifolia has elliptic oblong leaves either entire or very minutely dentate. Both the staminiferous and pistiliferous flowers are solitary, sessile, and opposite, having one in every bract. This species, like the former, is an evergreen shrub or low tree, and grows on the mountains of Mexico. According to Loudon there is but one specimen of this very beautiful and desirable shrub preserved in the garden of the Horticultural Society. It was brought over in the year 1839. There are some other species of Garrya recognised by various botanists: *G. Lindleyi*, considered by Mr. Bentham as a variety of *G. laurifolia*; *G. macrophylla*, *G. oblonga*, and *G. ovata*, are described in Bentham's 'Plantæ Hartwegianæ' from specimens collected by Mr. Hartweg in different parts of Mexico.

(Loudon, *Encyclopædia of Trees and Shrubs.*)

GASCOIGNE, GEORGE, was the son of Sir John Gascoigne, the head of an antient family in Essex. The date of his birth is uncertain; but it was not later, and may have been earlier, than the year 1537. He was educated at Cambridge, and afterwards entered at Gray's Inn as a student of law: but his youthful prodigality caused his father to disinherit him, as far as it was possible to do so. Upon this he sold all his property that was at his disposal, and endeavoured in vain to obtain employment at home. He embarked for Holland, and took service as a soldier of fortune under William, Prince of Orange, whose favour he gained in two years of hard and bloody warfare. At the end of this time he was one of five hundred Englishmen who, being left to garrison the indefensible fort of Falkenburg, fought their way to the walls of Leyden during its siege, but, being refused admittance, were compelled to surrender to the Spaniards. Their lives were spared; and they were sent home to England after being kept four months as prisoners. Here Gascoigne resumed the study of the law, but never prosecuted the profession seriously or with success; and he appears to have possessed means sufficient for his subsistence, although we read of his having been at one time, towards the close of his life, a prisoner in the Compter. He married (it is said) a Scottish lady whom he met in France; and usually resided at Walthamstow in his native county, where gardening and literary composition were his chief employments. In 1575, having been introduced to Queen Elizabeth, he attended one of her progresses; and at Kenilworth, on that occasion, he recited verses before her, and wrote an account of the pageantries. It will be recollected what use Sir Walter Scott has made of this incident. He died of some slow disease, at Stamford, on the 7th of October, 1577, commending his wife and child to the bounty of the queen. The earliest of Gascoigne's printed volumes bears date 1572; and his works were collected ten years after his death, in a volume bearing this title: 'The whole Woorkes of George Gascoigne, Esquyre: newly compyled into one volume: that is to say, His Flowers, Hearbes, Weedes; the Fruites of Warre; the Comedie called Supposes; the Tragedie of Iocasta; the Steel Glasse; the Complaynt of Phylomene; the Storie of Ferdinando Ieronimi; and the Princelye Pleasures of Kenelworth Castle,' London, 1587, 4to. black letter. The chief among his non-dramatic poems is the satire called 'The Steel Glasse,' written in blank verse, and first printed in 1576. This poem, with the 'Fruites of Warre' (which gives many particulars of the author's life), and several other specimens of his poetry, are reprinted in Southey's 'Select Works of the British Poets, from Chaucer to Jonson,' 1831; and either from those, or from pieces given by Campbell and others, a notion may be formed of the serious ethical tone of feeling, the frequency of familiar illustration, and the antique and half-allegoric cast of imagery, which distinguish the works of this interesting old poet. His prose 'Notes of Instruction concerning the makynge of verse' have been reprinted by Mr. Haslewood, in his 'Ancient Critical Essays upon English Poets and Poesy,' 1815. Gascoigne holds likewise a place in the history of the English drama. His comedy of 'The Supposes,' a free translation from 'Gli Suppositi,' of Ariosto, was first performed by the gentlemen of Gray's Inn in 1566; and is the earliest prose play existing in the language. It is reprinted by Sir John Hawkins in the third volume of his 'Origin of the English Drama;' and its chief importance arises from the use supposed to have been made of it in 'The Taming of the Shrew.' The 'Iocasta,' first played at the same place and in the same year as 'The

Supposes,' is founded upon the 'Phœnissæ' of Euripides, of which however it is an alteration rather than a translation. Three authors had part in it, Gascoigne, Francis Kinwelmarsh, and Christopher Yelverton, Gascoigne working on the second, third, and fifth acts. Some specimens of it, with a short critical estimate, will be found in Collier's 'History of English Dramatic Poetry.' It is mainly curious as having been the second drama in blank verse which was composed in our language. Mr. Collier gives also an account of another dramatic piece of Gascoigne, 'The Glasse of Government,' first printed in 1575, which possesses very little merit.

GASCOYGNE, WILLIAM, an astronomer of the seventeenth century, who is distinguished by having been the first inventor of the micrometer (about 1641). The instrument appears to have originally consisted either of two parallel wires, or of two plates of metal, placed in the focus of the eye-glass of a telescope: the nearest edges of the plates, which were ground fine, were parallel to one another; and the plates or the wires were capable of being moved, so that the image of an object could be exactly comprehended between them: a scale served for the measurement of the angle subtended by the interval, and Gascoygne is said to have used this instrument for the purpose of measuring the diameters of the moon and planets, and also for determining the magnitudes or distances of terrestrial objects.

The few circumstances which are known concerning this ingenious person, and the manner of his death, are given under HORROCKS, JEREMIAH, P. C.

GASES, LIQUIFICATION OF. [CHEMISTRY, P.C.S.]

GASSE, STEFANO and LUIGI, twin brothers, and both architects, were born at Naples, August 8th, 1778, but were of French origin. When not above seven years of age they were sent to Paris, and there confided to the care and instruction of their maternal uncle the Abbate Minotti. On their education being sufficiently advanced, they made choice of architecture as their profession; and they not only obtained many premiums at the Institute of France, but were sent to complete their studies at Rome. After remaining five years at Rome, they were recalled by their parents to Naples in 1802, where they settled and practised together. The strong attachment between the two brothers was interrupted only by the death of Luigi (November 11th, 1833); and they appear to have been well suited to aid each other, no less by the difference of their talents than by the similarity of their dispositions—Luigi possessing greater fertility of ideas and readiness in design, while Stefano had more practical skill and knowledge of construction. Thus, the works executed by Stefano during the life-time of Luigi, belong to both brothers in common; and Naples owes to them many of its best modern edifices. Among the more important of them, and which appear to have been erected after the death of Luigi, as they are ascribed to Stefano in particular, are, the Astronomical Observatory; the additions to the Villa Reale; the Reale Edifizio di San Giacomo, an immense pile of building, erected at the cost of 1,500,000 ducats, and containing the bank, exchange, prefecture, and a great number of other public offices; and the Dogana, or new custom-house. Besides these public works he built not a few mansions for private individuals: the Palazzo Montemiletto; that of the Duca di Terranova, the Casino Cacace at Sorrento; the Casino Dupont, and that called 'di Sofia,' in the Strada Nuova di Posilipo. He also designed the new streets Santa Lucia and Mergellina, and the entrance to the new Campo Santo or public cemetery, but he did not live to complete any of these last-mentioned improvements. After a short illness the Cavaliere Stefano Gasse—for he had been complimented with the cross of the order of Francesco Primo—died at Naples, February 21st, 1840.

GASTEROMYCETES, a suborder or cohort of the natural order of Fungi. [FUNGI, P. C.] It is distinguished from the higher forms of fungi [HYMENOMYCETES, P. C. S.] by the reproductive organs being included in a case of some kind or another. Many of the genera and subsections of Fungi belonging to this suborder, and the suborders Hyphomycetes and Coniomycetes, have been described in the 'Penny Cyclopædia,' so that those only which have been omitted will be mentioned here, in order that a connected view of the family, more especially as it exists in Great Britain, may be given.

The first tribe of the Gasteromycetes is *Angiogastres*. Of this tribe there are four sub-tribes or sections. The first, *Phalloidei*, has a distinct receptacle at length bursting through the excipulum. Of this section the genus *Phallus* is the type: it has a stipitate pileiform receptacle, with an entire border. There are several species of this genus known in Great Britain, where they are called Stinkhorns on account of their disgusting smell. *P. impudicus*, the common Stinkhorn, is found in woods and thickets in summer and autumn. It grows under sticks and leaves, and frequently, when not to be seen, may be detected by the disagreeable fœtid odour which it exhales. The stem is from one to six inches in height, and the uterus is about as large as a hen's egg, consisting of two coats distended with jelly and a delicate membrane surrounding the pileus. *P. caninus* is a rare species. It grows in woods and hedges in the south of England. From the colour of its pileus, by which it may be distinguished, it is called Red-headed Stinkhorn. Mr. Curtis, in his 'British Entomology,' has described a third species, *P. iosmus*, which was found at Lowestoft in Suffolk. At first it has a smell somewhat like that of violets, but it becomes very fœtid when dried.

The second section is *Tuberaceæ*. [TUBERACEÆ, P. C.] The third section, *Nidulariacei*, has a receptacle filled with free or elastically pedicellate sporangia. The type of the section is *Nidularia*, or Bird's-nest Peziza. There are two species of this genus found in Great Britain. The most common is *N. campanulata*, which is found on the ground, covering dung, sticks, &c. They are pretty little fungi, resembling birds' nests, not only in their shape, but also in their sporangia, which lie at the bottom of the receptacle like the eggs.

The fourth section, *Carpoboli*, have a solitary sporangium protruding from the receptacle. The genera belonging to it are *Carpobolus*, *Sphærobolus*, *Thelebolus*, *Pilobolus*, *Atractobolus*.

A species of the last named, *A. ubiquitarius*, is found on wood, stones, and other things, after rain, appearing like scattered meal. The Rev. M. J. Berkeley, says, however, that he is convinced that it is of insect origin. *Sphærobolus stellatus*, is found on rotten wood and sticks, in the autumn. In its early state it is covered by a fine woolly or cottony web which is very fugacious. When the young plants have pushed through this web, they have the appearance of mustard seeds. Each plant consists of an outer and an inner membrane. At the time of the opening of the outer membrane, the inner one, which is then concave and with its mouth uppermost, projects the ball of sporules which it contains, like a bomb from a mortar, to a distance of several inches. The cracking noise occasioned by this phenomenon is so great as to be distinctly audible at some distance. 'This is unquestionably,' says Dr. Greville, 'the most wonderfully constructed plant which it has fallen to my lot to describe. That so great a degree of force should exist in a body not larger than a pin's head, and that force exerted in defiance of considerable resistance, seems to surpass the power of anything to account for it satisfactorily.'

The tribe *Pyrenomycetes* is frequently regarded as a suborder or cohort. [FUNGI, P. C.] It consists of genera having more or less the characters of *Sphæria*. [SPHÆRIA, P. C.] Most of the species are found on the decaying leaves of other plants, and vary with the species of the plant on which they grow. The genera in which the greatest number of species have been described by British botanists are *Cytispora*, *Phoma*, *Dothidea*, *Asteroma*, *Rhytisma*, *Phacidium*, *Hysterium*, and *Leptostroma*.

The third tribe is *Trichospermi* [TRICHOSPERMI, P. C.]; the fifth, *Trichodermacei* [TRICHODERMACEÆ, P. C.]

The fifth tribe, *Perisporiacei*, has a peridium scarcely distinct from the nucleus, and the sporidia immersed in pulp, free or included in peridiola. The genera in this tribe are not numerous. *Racodium*, the Mouse-skin Byssus, is placed here by some authors; by Fries, in Byssaceæ. [BYSSACEÆ, P. C. S.]

The most extensive genus is *Erysiphe*, the species of which produce various forms of mildew. It has a fleshy peridium opening at the collapsing apex, subgelatinous within; the sporidia included in one or more peridiola, often [illegible] sporidiola; the thallus floccose, effused, free.

E. pannosa, the Rose Mildew, is found on the le various species of rose. It is easily known by clothy aspect, which is very different from the rest of On this account it is referred by Fries to *Eurotium*.

E. communis is an extremely common fungus, on various kinds of herbaceous plants. It is n that the various forms of Erysiphe, which described according to the species of plant on

ave a common origin. The same may be said of the
f *Uredo*, *Æcidium*, and *Puccinia*. [MILDEW, P. C.;
P. C.]

uborder *Hyphomycetes* of Berkeley and others includes
f the genera that are referred by Fries to the fourth
Coniomycetes. The first tribe, *Cephalotrichei*, includes
ra *Isaria*, *Anthina*, and *Ceratium*. The species of the
are not numerous or common. *Ceratium hydnoides*
common on rotten wood.

tribes *Mucori*, *Dematiei*, and *Mucedines* consist of
genera of plants forming moulds, mildews, blights,
&c. [MILDEW, P. C.; MOULDINESS, P. C.; SPOREN-
, P. C.] Some of the species placed in these tribes
eley are described under BYSSACEÆ, P. C. S.

tribe *Sepidoniei* includes the genera *Sepidonium*,
ion, *Psilonia*, and *Fusisporium*. They have all
ose mycelium, without any distinct sporidiferous
s; and the sporidia, heaped together, lying upon and in
springing from the matrix. The species of Fusis-
are found in decaying fruits and vegetables. Von
has described one under the name of *F. Solani*, which
the tubers of the potato, and produces a kind of rot.
curred epidemically among potatoes in Germany in
d at the present moment (October, 1845) a similar
e has attacked the potato-crop of Great Britain.
e fungus is the cause of the disease may however be
, and it is probable that the fungus is only the result
ased state of the plant.

ast suborder, *Coniomycetes*, embraces those fungi whose
are produced beneath the epidermis of plants, and
many instances appear to be rather diseases of the tissue
ependent existences. The first subsection or tribe is
larini. [TUBERCULARINI, P. C.] The second tribe,
orei, consists of sporidia glued together into a nucleus,
any covering, under the cuticle of plants, at length
forth together with the gelatine or free. The genera
tribe are *Nemaspora*, *Septoria*, *Stilbospora*, *Didyma-*
and *Melancorium*.

third tribe, *Sporidesmiei*, have their sporidia chained
into flocci. The genera are *Aregma*, *Torula*, and
a.

fourth tribe, *Hypodermii*, includes those species of
hich are found underneath the cuticle of living plants.
re said by Fries to have 'no proper vegetation, their
arising from an anamorphosis of the cells of living
les.' To this definition Berkeley objects, and regards
cies as distinct plants. The principal genera are
ia, *Æcidium*, and *Uredo*. [UREDO, P. C.]

th, *English Flora*, vol. v. part ii.; Burnett, *Outlines*
ny; Lindley, *Natural System*.)

STROBRANCHUS. [MYXINE, P. C. S.]

TI, BERNARDINO, called il Soiaro from the oc-
n of his father, was born at Cremona about 1495.
ne of the most distinguished of Correggio's pupils and
s: there are several admirable works by him in Parma,
a, and Cremona. The Miracle of the Loaves in the re-
of the Padri Lateranensi at Cremona, painted in 1552,
sterpiece, as is also the Ascension of Christ in the
of San Sigismondo. He died in 1575. Il Soiaro is
by other cities, but Cremona appears to have the best
him.

t, *Notizie Istoriche dei Pittori, &c. Cremonesi*;
Storia Pittorica, &c.)

DEN, JOHN, was born in 1605 at Mayland in
his father being vicar of that parish. His school-edu-
was received at Bury Saint Edmunds; whence he re-
to Saint John's College, Cambridge, and took his
in arts in the ordinary course. About 1630 he re-
to Oxford, and became a tutor in Wadham College;
a later period he took the degrees of bachelor and
in divinity. In 1630 he was appointed chaplain to
rl of Warwick, through whose patronage he received
clesiastical preferments, a rectory in Berkshire, and a
e in the county of Cambridge. In the earlier part of
ory, led perhaps by the turn of his patron's politics,
ined strongly to the popular side; and a sermon which
ched before the House of Commons, in 1640, was re-
by a public present of a silver tankard. Next year the
ent presented him to the lucrative deanery of Bocking in
to which however the cautious doctor thought it right
his title confirmed by Archbishop Laud, then a pri-
the Tower. After the breaking out of the civil war,
submitted to the Presbyterian government, but with a hesitation which was suspicious, and which appears to have been punished by his exclusion from the Westminster Assembly of Divines after he had been named a member of that board. He gave up the use of the liturgy in the service of the church, but not till the last moment when it was possible to preserve it: and he subscribed the covenant, but not till he had written a treatise against it. He thus retained his preferments, but gradually approached nearer to the royalist church-party, and contracted with some members of it relations which, by his own account, led to important consequences. Upon the Restoration, Dr. Gauden was appointed chaplain to Charles II.; and before the close of the same year he was created bishop of Exeter, whence in 1664 he was translated to the see of Worcester. Shortly afterwards, on the 20th of September in that year, he died, of a disease which was either caused or aggravated by his disappointment in being obliged to put up with the bishopric of Worcester in place of the more valuable one of Winchester, which he had very eagerly solicited.

In the course of this solicitation the assertion was made which gives interest to Bishop Gauden's history and character. He alleged that he was the real and sole author of the famous work called 'Eikon Basilike, the Portraicture of his Sacred Majesty in his Solitudes and Sufferings,' which, purporting to contain meditations and prayers composed by King Charles I. in his captivity, had been published in 1648, a few days after his decapitation, and had excited a very lively sympathy towards the supposed author. The bishop's claim, urged privately in letters to Lord Clarendon and the Earl of Bristol, did not at once become the subject of open discussion; but the controversy was commenced in 1692, by an assertion of Gauden's authorship, published by a clergyman who had resided in his family. The curious question thus raised has been discussed again and again by our historical writers. An elaborate history of the controversy is given by Dr. Wordsworth in his two works upon it: 'Who wrote Icôn Basilikè? Considered and Answered,' 8vo., 1824; and 'King Charles the First the Author of Icôn Basilikè, further proved,' 8vo., 1828. Upon the merits of the controversy, it is here enough to say, that Warburton, in pronouncing doubtfully in favour of the genuineness of the work, had reason to declare the matter to be 'the most uncertain he ever took pains to examine;' and that, in our own day, and since Dr. Wordsworth entered the field, the claim of Gauden has been strenuously supported by Mr. Hallam and by other writers of authority.

Gauden was the acknowledged author of a large number of sermons and tracts, chiefly bearing upon questions of ecclesiastical polity. A list of these, containing nineteen or twenty pieces, is given in the article under his name in the 'Biographia Britannica.'

GEARING, or GEERING, in machinery, is a term somewhat indefinitely applied to a train of toothed wheels, or other similar contrivance, for transmitting motion. Couplings [COUPLING, P. C. S., p. 433] may in some cases be considered a kind of gearing; and the expression 'to throw machinery *into* or *out of gear*' is commonly applied to the act of engaging or disengaging such connections.

The subject of gearing generally is treated of under WHEELS, and WHEELS, TEETH OF, P. C., pp. 310, 318, where the principal varieties of toothed wheels are described. We may here further notice two ingenious contrivances for multiplying rotatory motion in a train of gearing, with greater rapidity than by any ordinary arrangement of wheels and pinions. The first of these was invented simultaneously by Mr. Dyer, in America, and by Messrs. M'Dougall, of Ferry-Bridge, in Yorkshire, and communicated by the former gentleman to Mr. H. Burnett, who obtained an English patent for it. The object of this invention, according to Hebert's account of it in the 'Engineer's and Mechanic's Encyclopædia,' vol i. pp. 621, 622, is to obtain a great difference in the relative velocities of the wheel and pinion, by a contrivance which in some respects resembles what is called a *worm-wheel*, or a wheel driven by an endless screw, while it is free from the objections attending the ordinary form of such an apparatus. As usually applied, the endless screw [WHEELS, P. C., p. 314] forms a tangent, or nearly so, to the periphery of the wheel, the axis of the screw being at right angles with that of the wheel. The force applied by the screw in turning the wheel is therefore exerted in the direction of its axis, and not of its radius; and the communication of motion is attended by much rubbing friction, and by considerable strain or longitudinal pressure upon the pivot or resisting point of the screw. Owing to these disadvantages the screw is rarely, if ever, driven by the wheel, so that the use of the apparatus is limited to the conversion of a quick into a slow motion. In the improved gearing, of which Hebert gives illustrative cuts, the axis of the spiral or endless screw lies parallel to that of the wheel, and the power is applied in the direction of its radius, while the rubbing is converted into simple rolling friction. The resistance is thus so greatly diminished that the screw may be driven with facility by the wheel, so that the apparatus may be employed to convert a slow into a quick motion, as well as, like the common endless screw, for converting quick motion into slow. The simplicity of this kind of gearing constitutes one very important advantage, for as by its use every tooth of the wheel produces a complete revolution of the screw or spiral pinion, a wheel of only ten teeth may be used to produce the same effect as, in ordinary gearing, would be produced by a wheel of a hundred teeth working into a pinion of ten leaves.

The other apparatus referred to is the contrivance of Mr. W. Franks, to whom the Society of Arts awarded their large silver medal in 1833. In it the periphery of the wheel is cut with two sets of teeth, alternating with one another, so that the wheel may be described as resembling two thin wheels, cut precisely similar, and mounted upon the same axis in such a way that the teeth of one shall be opposite to the intervals of the other. Into this wheel works a pinion of peculiar shape, having four teeth or leaves, two of which work into one set of teeth on the wheel, and two into the other set. By this curious arrangement a complete revolution of the pinion is effected by the passage of only two teeth of the wheel; or rather, by the passage of a portion of the periphery of the wheel equal to two teeth; although, owing to the employment of duplicate gearing, four teeth, two of each set, are called into action to produce the revolution. Cuts of the apparatus are given in the forty-ninth volume of the Society's 'Transactions,' part ii. p. 116.

GEE, JOSHUA, was an eminent London merchant of the earlier part of the eighteenth century, but we have not been able to discover any particulars of his personal history. He was one of the authors of the work called 'The British Merchant,' originally published in numbers twice a week in 1713, and afterwards collected and reprinted in 3 vols. 8vo., 1721, and again in 1743. It was set up in opposition to the commercial treaty with France which was proposed by ministers after the peace of Utrecht, and to Defoe's thrice a week paper, entitled 'Mercator, or Commerce Retrieved,' in which the treaty was defended. 'The British Merchant' contains perhaps the most complete exposition that has been given of what is called the Mercantile or Balance of Trade theory; but, independently of their systematic notions, many of the facts collected by the writers are curious and valuable, and their publication forms a record of the state of many branches of our commerce at the period when it appeared. (See a full account of it in the 'Pictorial History of England,' vol. iv. pp. 207—213.) In the preface to the republication it is stated by the editor, Mr. Charles King, that 'Mr. Joshua Gee, merchant, was a very great assistant, and laboured with much industry in these papers.' Gee however is best known by his separate work, entitled 'The Trade and Navigation of Great Britain considered,' which originally appeared at London in 8vo. in 1729 or 1730 (for copies of the first edition seem to have sometimes one, sometimes the other of these dates). It was reprinted at London in 8vo. in 1731, and in 12mo. in 1738; and there is a Glasgow edition of 1760, called on the title-page the sixth, and another in 12mo. of 1767, professing to contain 'many interesting Notes and Additions, by a Merchant.' Mr. M'Culloch, in his 'Literature of Political Economy' (1845), makes a sixth edition to have appeared at Glasgow in 1735; but this must be a mistake. The advertisement prefixed to the Glasgow edition of 1768 speaks of the book as having for many years been very scarce. Gee himself, in an address 'To the Reader,' states that his treatise had been written, and even printed for the first time, without any design of publication, and only that a few copies might be put into the hands of the ministers of state and other great men. But he adds, 'After I had delivered a few of them, I understood, by some great persons, that a discourse upon trade would be very acceptable to the king, who was pleased with every opportunity of demonstrating his care and affection for his people; and that it would also be acceptable to the queen and prince.' He thereupon sent copies to these royal personages. Finally, when it got abroad that he had written the 'Discourse,' he was informed that if he did not permit it to be *published*, it would fall into the hands of such as might print it and alter the sense; so he determined to publish it himself. In a 'Preface,' which follows, he further attributes the origin of the work to his having been desired by some persons of distinction in the late reigns to give them his thoughts on naval stores, and divers other subjects in trade. The book is divided into thirty-four chapters, and, besides the general principles of trade, discusses the particular commerce carried on by England with every part of the world. The two main propositions which the author attempts to make out are, 'That the surest way for a nation to increase in riches is to prevent the importation of such foreign commodities as may be raised at home,' and 'That this kingdom is capable of raising within itself and its colonies materials for employing all our poor in those manufactures which we now import from such of our neighbours who refuse the admission of ours.' In his advertisement Gee informs us that the poverty and necessity in which he had seen the poor in several parts of the kingdom had touched him very sensibly, and he had spent a great deal of time from the service of his family 'to find out methods for promoting so public a blessing as turning the employment we give the poor of foreign nations to our own.' His scheme however is merely to put down begging in the streets, and to employ the poor in workhouses. On the whole, the book, though it was formerly popular, is not one of any remarkable ability or value, except as giving a clear account in small space of what the trade of the country then was.

GELL, SIR WILLIAM, was born in 1777, and was a younger son of Philip Gell, Esq., of Hopton, in the county of Derby. The original family name was Eyre, which had been changed by his grandfather to Gell, after his mother, who was of the family of the Gells of Hopton, Baronets. Sir William was educated at Jesus College, Cambridge; and took his degree of B.A. in 1798, and of M.A. in 1804. He was for some time a Fellow of Emanuel College. He is stated in the account to which we are indebted for the particulars of his biography, to have received his knighthood, 14th May, 1803, on his return from a mission to the Ionian Islands; but what was the nature of this mission, if it ever took place, we do not know, and he certainly was not knighted at so early a date. He had already spent much of his time abroad, as his publications show, when on the Princess of Wales having left England in 1814, she appointed him one of her chamberlains. He attended the princess in various parts of Italy, especially at Naples and Rome; as appears from the evidence he gave at the bar of the House of Lords in the course of the proceedings taken against her after she became queen and had returned to England in 1820. After this Gell returned to Italy, and he resided mostly at Naples till his death, which took place there on the 4th of February, 1836. He had also however a house at Rome, in which he occasionally resided. He had long suffered severely from gout and rheumatism; and for some years before his death he had nearly altogether lost the use of his limbs.

He first appeared as an author in 1804, when he published his work entitled 'The Topography of Troy and its Vicinity, illustrated and explained by Drawings and Descriptions,' folio. This was followed by 'The Geography and Antiquities of Ithaca,' 4to., 1808; 'The Itinerary of Greece, with a Commentary on Pausanias and Strabo, and an account of the Monuments of Antiquity at present existing in that Country,' 4to., 1810; 'The Itinerary of the Morea, being a particular description of that peninsula, with a map of the route,' 8vo., 1817; 'Pompeiana, or Observations upon the Topography, Edifices, and Ornaments of Pompeii' (in conjunction with J. P. Gandy, Esq.), 2 vols. 8vo., 1817-19; 'Attica,' folio, 1817; 'Narrative of a Journey in the Morea,' 8vo. 1823 (the journey having been performed in 1804); 'The Topography of Rome and its Vicinity,' 2 vols. 8vo., 1834 (an important work in reference to the cities antiently existing in the Campagna di Roma); 'Rome and its Environs' (a map), 1834. Gell was a good draftsman, and he has the merit of having carefully examined and delineated many monuments of antiquity. Some of his works are hurried performances; but they have all a certain value as being the results of personal observation. The one that brought the author most notice was his 'Pompeiana;' of this a continuation, or new series, in 2 vols. 8vo., was published in 1835.

(Notice in *Gentleman's Magazine* for June, 1836, p. 660; and Gell's *Works.*)

GENERAL ISSUE. [PLEADING, P. C.]

GENEVRE, MONT, a mountain of the Alpine range [ALPS, P. C.], which gives name to one of the principal cols or passes communicating between France and Piedmont. It is

part of the Alpine range known to the Romans as
Cottiae (the Cottian Alps), and still frequently called
name, or its equivalents in the various languages of
Europe. The peak of Mont Genèvre is on the S.
the pass, and rises to the height of 3592 mètres, or
feet, above the level of the sea. The springs which
monly regarded as the sources of the Dora (an affluent
Po) and of the Durance are on the sides of Mont
e. The pass forms the principal communication
the south of France and Piedmont. Though pos-
several advantages over Mont Cenis, the next pass to
thward, it is less convenient for travellers coming from
d Lyon, as it involves the necessity of traversing
mountain-pass, the Col du Lautaret (the summit of
2091 mètres, or 6856 feet, above the level of the
which the traveller crosses a branch of the Alps
Grenoble and Briançon. A third pass, that of the
Sestrières, on the Sardinian side, increases the diffi-
the passage by the pass of Mont Genèvre. The
the south of France passes through Gap and Em-
Briançon, and is practicable for carriages; that from
to Briançon (by Vizille, Bourg d'Oysans [Bourg,
the wild and sombre valley of the Romanche, the Col
aret, and the valley of the Guisanne) is practicable
foot-passengers or mules.

Briançon the road runs for a league through the nar-
ge which affords a passage to the Durance, to the
f La Vachette, at the foot of Mont Genèvre; here it
he Clarée, which, though considered only an affluent
urance, ought, from its greater length and volume of
r, to be regarded as the main stream. The ascent
Vachette to the summit has been formed through a
f firs, larches, and pines, now for the most part
d; it has numerous short steep ascents and sharp
nd offers to the traveller looking back a fine view of
[Briançon, P. C.], with its numerous forts, pic-
ly situated, and lofty mountains. The summit of the
the lowest of all the passes of the Alps except the Col
de, being 1974 mètres, or 6472 feet, above the level
sea, according to Malte-Brun: Brockedon's statement,
et, is, we believe, too low. The summit is a plain
les long, extending E. and W., and sheltered by
untains on either side. It is cultivated, and the
ion extends up the slope on each side to an elevation
aps 60 or 80 mètres (180 to 240 feet) above the
The surrounding heights are crowned with larch-
Barley, oats, and rye are grown on this plain;
ough the cold renders the amount of the harvest very
ous, the crop rarely fails entirely. The gardens are
productive than on the summit of the pass of Mont
and the spring is earlier: the zoology of the district
t to the pass is also indicative of its warmer tempera-
volves are more numerous, but the chamois is not so
. Bears are also more numerous than near the pass
t Cenis, but this is probably owing to the covert
by the pine-woods. In the plain at the summit of
s is a hamlet called Bourg Mont Genèvre, about
iles from Briançon. There was here an hospice for
ection of travellers, founded in A.D. 1340, by Hum-
rd of Briançon; it stood in the midst of the village,
long fallen into decay. Napoleon designed, in 1807,
re it, and to place it in the hands of the Trappist
but the design was never fulfilled, though the following
on was prepared for it by the members of the
e:—

NEAPOLEONIS AUG. PROVIDENTIA
HOSPITIO GENEVRENSI
CONDITO
CARITATIS ERGA PEREGRINANTES
OFFICIA TRAPENSIBUS EXERCENDA
RESTITUIT
ANNO MDCCCVII.

the summit of the pass the road winds down the
ide of the mountain five or six miles to Cesanne, at its
the Sardinian side. Where the slope is considerable
soil soft, the road is secured by pine-trees embedded
roadway at right angles to its direction, firmly propped
edged with stones and earth, and secured at their
xtremity by a strong railing. The road commands
view of the Col de Sestrières, distant about ten or
miles from Cesanne. Two roads lead from Cesanne
n: one by the Col de Sestrières, the picturesque and
impregnable fort of Fenestrelles, used as a state prison, and the town of Pignerol; the other by Exilles and Susa, where it unites with the road from Grenoble and Chamberri [Chambery, P. C.] over Mont Cenis.

The pass of Mont Genèvre was known to the antients. The Caturiges occupied the country on the west or French side of the pass; the Garoceli, the east or Sardinian or Piedmontese side. That Bellovesus, the reputed leader of the Gauls in their early occupation of northern Italy, crossed the Alps by this passage, is stated by Livy (v. 34), whom in this case we must regard as reporting the prevalent tradition. The same writer (xxi. 32-38), and Strabo (lib. iv. p. 209, ed. Casaub.; p. 319, ed. Janson, Amsterd. 1707) make this the passage by which Hannibal crossed the Alps; but this is very disputable [Hannibal, P. C.], and the best modern critics are in favour of his passage by the Little St. Bernard, the Alpis Graia of the antients. The prevalent opinion among the Romans, according to Livy, was in favour of the Alpis Pennina, or Great St. Bernard. Cæsar certainly fought his way across Mont Genèvre, in his rapid march with five legions to arrest the migration of the Helvetii. (Caes. *De Bell. Gall.*, i. 10.) In the time of Livy the pass was known by the name of the Saltus Taurinus (Liv. v. 34); in the time of the earlier Roman Emperors it was usually designated Alpis Cottia, or Alpes Cottiæ, a name properly applicable to the adjacent parts of the Alpine range. During the continuance of the Western Empire it was one of the main communications between Italy and Gaul. The name Alpes Cottiæ, or Cottianae, which occurs in Tacitus (*Hist.* i. 61 and 87), was derived from Cottius, an Alpine chieftain, who amid his mountain fastnesses maintained his independence after the subjugation of the rest of Gaul; and who, having made his peace with Augustus Cæsar, contributed much to the improvement of the route. (Ammian. Marc., xv. 10.) Vestiges of Roman works in the pass may still be traced, and columns and inscriptions have been dug up at the Bourg Mont Genèvre. In the middle ages the Latin name of the mountain and pass was Mons Janus: this name and the modern designation are evidently connected. During the middle ages and down to the present century the Col was passable only by mules and persons on foot. Towards the close of the last century, a conflict took place between the French and Sardinian troops on the very summit of the pass. In 1802, at the suggestion of J. C. F. Ladoucette, Préfet of the department of Hautes Alpes, and with the sanction of Napoleon, the present road was made by the inhabitants of Briançon and the neighbouring communes, assisted by the soldiers of the garrison of Briançon. This magnificent road from Briançon to Cesanne is thirty feet wide, and is well kept up on the French side of the frontier. It was called by order of Napoleon 'Route d'Espagne en Italie,' and was opened in 1804. An obelisk, sixty feet high, in honour of the emperor, was raised in 1807, with four inscriptions: one in Latin, one in Spanish, one in Italian, and one in French, on tablets of black Como marble. The inscriptions were destroyed by the Austro-Sardinian army, which entered France by this way in 1815, but the obelisk itself was allowed to remain.

(Vaysse de Villiers, *Itinéraire Descriptif de la France*; Ladoucette, *Histoire*, *Antiquités*, *&c. des Hautes Alpes*; Brockedon, *Passes of the Alps*.)

GENISTA (the Latin Genista), a genus of plants belonging to the natural order Leguminosæ. The calyx is 2-lipped; the upper lip bifid, the lower trifid. It has a subulate ascending style; a terminal, oblique, introrse stigma. The species have yellow flowers, and most of them yield a yellow dye. The Planta Genista, or Whin, the Gen of the Celts, and the Gênet of the French, was the badge of a long race of English kings, hence called Plantagenets. Upwards of eighty species are included in this genus, but few are applied to any important uses. They are found principally in the south of Europe, and some few are natives of Great Britain.

G. pilosa has a smooth procumbent stem, and obovate, lanceolate, obtuse leaves; ovate, blunt stipules. The peduncles, calyx, and underside of the leaf are silky, and the pods hairy. It is a native of the south of France, and is also found in Suffolk and Cornwall in England, in sandy places.

G. tinctoria, Dyer's-weed, or Woad, has a depressed stem, with erect branches, without thorns; lanceolate leaves, hairy at the edges; minute subulate stipules; racemose flowers; and glabrous corolla and pods. The branches are from one to two feet high, glabrous and downy above. This plant is a native of Europe, and is found in pastures, fields, and thickets in England. The flowers yield a yellow colour, which is much used for dying wool. When cows are allowed to feed on this plant their milk becomes bitter and disagreeable, and the unpleasant taste of cheese and butter is often attributable to this cause. *G. tinctoria* has also a medicinal reputation. The seeds act as a mild purgative, and the ashes are also said to be a valuable diuretic.

G. anglica, Needle-Whin, has a spinous ascending stem, leafless below; unarmed, glabrous, flowing branches; ovate-lanceolate leaves; and glabrous stems and corolla. It is a native of Europe, in France and Denmark, and is found in Britain on moist boggy commons.

G. acanthoclada has trifoliate leaves, nearly sessile; linear, complicated, silky leaflets; stiff and spinose branches. The flowers almost opposite, and disposed along the branches in a kind of interrupted spike. It is a native of the Levant in exposed places, and in the island of Melos. This plant appears to be the *μέλαινα ῥίζα* of Hippocrates, *σκορπίος* of Theophrastus, and the *ἀσπάλαθος* of Dioscorides.

G. Hispanica has lanceolate villous leaves; branched, stiff spines; terminal racemes, somewhat capitate. It is a native of Spain and the south of France. Fraas states that this species is the 'genista' of Roman writers (Virgil, 'Georg.' ii. 434; Pliny, xxi. 9. 12, 22. 24, 9.; Columella, 4, 31).

G. purgans is an erect branched shrub with very few leaves and axillary solitary flowers on short pedicels. It is a native of France, on hills, especially in the Cevennes, where it is used by the villagers as a cathartic.

G. monosperma has erect branches; very few linear oblong leaves, clothed with a depressed pubescence; and lateral few-flowered racemes. It is a native of Spain, Portugal, Barbary, and Egypt. On the shores of Spain it is found to be very useful in binding the otherwise drifting sand, and by its beautiful fragrant blossoms it converts a barren waste into a lovely garden. The goats feed on the leaves and young branches, of which they are particularly fond. The Spaniards call both the plant and the districts over which they grow Rætamas, from the Arabic word Rætam. The species of this genus thrive well in a mixture of loam, peat, and sand, and young cuttings will easily strike in a potful of sand with a bell glass over them, which must be taken off and wiped occasionally, lest the cuttings absorb too much moisture.

(Don, *Gardener's Dictionary*; Babington, *Manual of British Botany*; Fraas, *Synopsis Plantarum Floræ Classicæ*; Burnett, *Outlines of Botany*.)

GE'OPHILA (from γῆ, the earth, and φιλ, love), a genus of plants belonging to the natural order Cinchonaceæ. It has the limb of the calyx 5-parted with linear spreading segments; the corolla tubular, with a pilose throat and 5 rather recurved lobes, with 5 anthers inclosed; the stigma bifid, the berry ovoid, angular, crowned by the calyx, 2-celled, 2-seeded.

The species are creeping herbaceous plants with stalked cordate leaves, like those of a violet; the stipules are solitary, undivided; the flowers sub-sessile, umbellate, surrounded by bracts, which are shorter than the flowers.

G. reniformis has the petioles hairy above; reniform obtuse leaves with the lobes at the base approximate; the bracts linear; the peduncles 4-6-flowered, shorter than the leaves. It is a native of moist shady places in the hotter parts of America, as Havanna, Jamaica, Puerto Rico, Brazil, and the basin of the Orinoco. The root of this plant is emetic, and may be used with advantage as a substitute for ipecacuanha. There are several species of this genus, all of which were formerly referred to the genus Psychotria.

(Don, *Gardener's Dictionary*; Lindley, *Flora Medica*.)

GEORGE, ST., is one of the Azores or Western Islands. It lies between 27° 50′ and 28° 20′ W. long, and 38° 30′ and 38° 45′ N. lat., between the islands of Terceira and Pico. It is a long, narrow island, extending in a west-north-west and east-south-east direction about thirty-five miles, with a breadth of about five miles. This would give an area of 175 square miles; but probably it does not exceed 160 square miles, or about ten square miles more than Rutlandshire.

The island appears to be entirely composed of volcanic rocks. They rise with an abrupt mural ascent along the northern shores, and this part of the island is almost uninhabited. But the southern coast is in general little elevated above the sea, and there occur many tracts of nearly level ground which are cultivated with great care. Along the middle of the island runs a more elevated tract, rising in some parts to more than 2000 feet, with an almost level top where it has not been changed by more recent volcanic eruptions. For though this island does not contain what may be properly called a volcano, it is subject to volcanic eruptions, accompanied with scoriae, ashes, pumice-stone, and volcanic sand, which cover extensive tracts of ground. The last and perhaps most violent of these eruptions happened in 1808.

The climate is extremely agreeable. As the temperature varies only between 50° and 75°, no severe cold is ever experienced in winter, nor is the heat of summer ever intense. Though rains are frequent, the air is not moist, which is ascribed to the absorption of humidity by the volcanic nature of the soil. St. George, like the other Azores, is particularly remarkable for the incessant gusts and gales to which it is subject throughout the year. Many attribute this circumstance to the volcanic nature of the group, but it probably originates in the difference of the temperature of the sea at large and that of the gulf stream, which approaches nearest the most western of the Azores.

St. George yields all the productions of the Azores, and most of them of superior quality. Its wines, especially that of Castelhenes, are superior to all others; they are exported to Fayal, and sold at Horta under the appellation of Fayal wines. Grain is not much cultivated, except Indian corn, of which sufficient is grown for the consumption of the inhabitants. The vegetables are of many kinds, among which the potato, sweet potato, and yams are most abundant; the yams are superior to those of any of the Azores, and almost equal to West Indian, both in size and flavour. In modern times the inhabitants have paid much attention to the cultivation of fruit, especially of oranges and lemons, and have had the greatest success. The higher grounds of the island afford excellent pasture for cattle; and butter and cheese, both of which are celebrated, are sent in large quantities to Horta. Cattle is exported to Madeira and Lisbon, and the meat is stated to be as good as English beef, except for fatness.

St. George constitutes a portion of the department of Angra. The capital is Ponto de las Velas, a city of about four thousand inhabitants, situated on the shores of a large open bay, and walled in on the sea-side: on the opposite side it is bordered by high mountains. Farther east are the two small towns of Urselina and Calheta.

The year in which this island was discovered is not known. It was taken possession of in the name of Jacomo de Bruges, by Guilherme van Deraga, in 1450, and colonized by a mixture of Flemings and Portuguese. The population is stated to amount to more than twenty thousand inhabitants. As the island has no safe harbour, it receives the foreign goods which it consumes from Angra or Fayal, to which places it sends its produce.

(Ashe, *History of the Azores*; Von Buch, *Physikalische Beschreibung der Kanarischen Inseln*; Boid, *Description of the Azores*.)

GEORGE OF DENMARK, PRINCE, has a place in English history as the husband of one of our queens, and as having resided many years in England and held a high political office. He was born 21st April, 1653, and was the youngest son of Frederick III., king of Denmark, and the only brother of Frederick's successor, Christian V. His mother was Sophia Amelia, daughter of George, duke of Lüneburg. He made his first visit to England, after a short tour in France, in July, 1669, when he was introduced at court, but remained only a few days. At the battle of Lunden, fought between the Danes and the Swedes, 14th December, 1676, Prince George is stated to have distinguished himself by his bravery; and the rescue of the king his brother, after he had been taken prisoner by the enemy, is attributed mainly to him. The Princess Mary of York having been married to the Prince of Orange in 1677, the duke her father is said to have pressed his brother the king to leave to him the disposal of his other daughter Anne; but Charles thought it more advisable to comply in this instance with the national wish, and to have her also married to a Protestant. Anne's first suitor was the Prince of Hanover (afterwards her successor, George I.), who came over to pay his addresses to her in 1681, but had scarcely landed when he was recalled by his father, who had negotiated a marriage for him with the daughter of the Duke of Zell. Some time afterwards overtures were made in behalf of his brother by the king of Denmark; and, Prince George having come over, he and Anne were married at St. James's on the evening of the 28th of July, 1683. 'The marriage,' says Burnet, 'did not at all please the nation; for we knew that the proposition came from France. So it was apprehended that both courts reckoned they were sure that he [the Prince] would change his religion.' For this apprehension, however, there never seems to have been the least ground.

ession of his father-in-law as James II., Prince
nade a privy counsellor; and he was not under-
have made any opposition to the measures of the
last moment. The truth however appears to be
mere cypher. Charles II. is said to have declared
ied him drunk and sober, and, he added with an
s nothing in him. Nobody seems to have thought
e at this time even to try to make a tool of him.
evolution came, he is understood to have acted
ection of his wife. It had been arranged some
y her and Lord Churchill (afterwards the Duke
gh), who was much in their confidence, that he
er to the Prince of Orange, and Anne had trans-
lliam an express promise to that effect. Prince
ver continued with the king till the night of the
mber (1688), when, being at Andover, on his
after having supped with James by his majesty's
rode off in company with the Duke of Ormond,
nrig, and Mr. Boyle, and joined William at
astle; having left behind him a letter to his
in which he attributed what he had done to
rotestant religion. 'What?' said James, when
f his flight, '*Est-il possible* gone too?' This,
the prince's common phrase on all occasions;
een in great requisition during some previous
eports of one desertion after another were con-
g in.

acceptance of the crown by William, Prince
aturalized by act of parliament, and immediately
ronation of the new king and queen, in April,
created an English peer by the titles of Baron
n, Earl of Kendal, and Duke of Cumberland.
ied the king to Ireland in 1690, and was pre-
ttle of the Boyne. He used to attend and vote
of Lords both in the reign of William and in
, and he was even made occasionally to vote
ourt in the former reign. His name stands
protest made against the rejection of the Place
which had passed the Commons, and the defeat
s only effected in the Upper House by the
ions of the government. In other cases, again,
et him to vote against his own convictions; as,
n that of the bill against Occasional Conformity
y the Tory ministry in the first year of Queen
about to divide in favour of which he is reported
o Lord Wharton, the leader of the opposition to
'My heart is vid you.' Indeed he was only an
formist himself, being in the habit of attending
service in a chapel of his own, although he sub-
e the sacrament according to the forms of the
gland when it became necessary to do so on his
ed to office.

ession of Anne, while the actual command of
s left in the hands of Marlborough, Prince
leclared generalissimo of all the queen's forces
nd; and he was also made lord high admiral,
novelty of a council to assist or act along with
gality of this arrangement, Burnet tells us, was
questioned; but the respect paid to the queen
matter from being brought forward in parlia-
the objections never went beyond a secret mur-
een also sent a message to the Commons desir-
ake some suitable provision for her husband in
l outlive her; and it was agreed that he should
have an income of 100,000*l*. 'He was,' says
y years older than the queen, and was troubled
a, that every year had its effects on his health;
t him into great danger this winter; yet the
it became her to provide for all events.' Great
wever was made in the Lords to a clause in the
the prince from being comprehended in an in-
ted by the act settling the succession on the
nover, which had provided that no foreigner,
ralized, should hold any employment under the
at family came to the throne. The clause was
wo grounds: first, as improperly inserted in a
hich the Commons have always maintained can-
l, though it may be rejected, by the Lords);
giving a false meaning to the incapacity in the
ion, which it was contended was never designed
ersons who had been already naturalized. But
ssed the clause, 'with the greatest earnestness,'
she had yet showed in anything whatsoever:

she thought it became her as a good wife to have the act passed; in which she might be the more earnest, because it was not thought advisable to move for an act that should take Prince George into a consortship of the regal dignity.' Burnet himself had his share in the displeasure conceived by the queen against those who opposed the clause; which, he asserts, was put into the bill by the court or Tory party 'only because they believed it would be opposed by those against whom they intended to irritate the queen.'

The prince's administration of the Admiralty was not glorious. Under date of the following year, 1703, we find Burnet already stating that at sea 'things were ill designed and worse executed:' 'the making Prince George our high admiral,' he goes on, 'proved in many instances very unhappy to the nation; men of bad designs imposed on him, he understood those matters very little, and they sheltered themselves under his name, to which a great submission was paid.' In 1703, in 1704, and again in 1707, the loudest complaints were brought forward in parliament both against the proceedings of the lord high admiral's council and the conduct of affairs at sea. Under date of the last-mentioned year Burnet writes:—'Great losses were made, and all was imputed to the weakness, or to a worse disposition, in some who had great credit with the prince, and were believed to govern that whole matter; for, as they were entirely possessed of the prince's confidence, so, when the prince's council was divided in their opinions, the decision was left to the prince, who understood very little of those matters, and was always determined by others.' In fact as Marlborough, now a duke, governed the army in his own name, he governed the navy also through his brother, Admiral George Churchill, who was all along the prince's chief adviser. The prince is said to have sometimes complained of his insignificance or want of influence; but his dissatisfaction evaporated in the quietest way. Lord Dartmouth has some curious notices of him in his splenetic notes to Burnet's history. In one place he says: 'His behaviour at the Revolution showed he could be made a tool of upon occasions; but King William treated him with the utmost contempt. When Queen Anne came to the crown, she showed him little respect, but expected everybody else should give him more than was his due; but it was soon found out that his interposing was a prejudice in obtaining favours at court.' Dartmouth goes on to state that all foreign princes had him in very low esteem; and he mentions some strange surmises made abroad as to the causes of his want of influence, which were certainly altogether imaginary. 'After thirty years living in England,' this note concludes, 'he died of eating and drinking, without any man's thinking himself obliged to him; but I have been told that he would sometimes do ill offices, though he never did a good one.' (Burnet, 'Own Times,' i. 643. See also note on ii. 489.) Burnet says in one place ('Own Times,' ii. 515) that the prince had been bred to the sea; but we apprehend this to be a mistake.

His death took place at Kensington Palace on the 28th of October, 1708. 'The queen,' says Burnet, 'had been, during the whole course of her marriage, an extraordinary tender and affectionate wife; and in all his illness, which lasted some years, she would never leave his bed, but sat up sometimes half the night in the bed by him, with such care and concern, that she was looked on very deservedly as a pattern in this respect.' In drawing the prince's character, besides giving him a mild and gentle temper, and making him free from all vice, Burnet says that he had made a good progress in mathematics, and knew much more generally than he could well express, 'for he spoke acquired languages ill and ungracefully.' His little capacity for business, however, was made still less by his indolence or love of ease, which appears really to have been his strongest passion, or the most marked point of his character. Anne bore him no fewer than nineteen children, of whom only five lived to be baptized, and even of these two died on the day on which they were born. A daughter Mary, born 2 June, 1685, lived till 8 Feb. 1687; another, Anne Sophia, born 12 May, 1686, lived till 2 Feb. 1687; only a son, William, born 24 July, 1689, and soon after created duke of Gloucester (though the patent never passed the great seal), and in 1696 elected and installed a Knight of the Garter, outlived his infancy: he died 30 July, 1700. He was a boy of great promise, and a copious account of him is given by Burnet, who was his preceptor. There are portraits both of Prince George and of the Duke of Gloucester at Kensington Palace. Prince George was a Knight of the Garter, but the date of his election is not recorded in any of the accounts we have consulted.

GERA′NIUM (from γέρανος, crane; the long beak which terminates the capsules resembles the bill of a crane), a genus of plants, the type of the natural order Geraniaceæ. The flowers have 5 petals and 5 sepals, 10 monodelphous stamens alternately larger and with glands at their base. There are 79 species of this genus enumerated, of which 13 are British; of these only two are applied to any useful or medicinal purpose.

G. Robertianum has 2-flowered peduncles; obovate, entire, or slightly emarginate petals; very long glabrous claws; transversely wrinkled downy capsules, smooth seeds, ternate agrimate leaves, and stalked trifid inciso-pinnatifid leaflets. This plant has small bright crimson flowers, and is found on waste ground, walls, and banks in Great Britain, in Brazil, and Chile. The whole herb has a strong disagreeable smell, which is said to be a preventive against bugs. A decoction of the plant is recommended as likely to give relief in calculous cases. It contains tannin and exerts an astringent action on the system, and is given to cattle in some diseases.

G. maculatum, Spotted Crane's-bill, has a rather angular stem covered with retrograde pubescence; 3-5 parted leaves with deeply-toothed lobes; obovate entire petals; the filaments of the stamens hardly ciliated at the base. This species is a native of North America, from Canada to North Carolina. The flowers are of a pale lilac colour. On account of the astringent nature of this plant, it is known in some parts of North America as *Alum-root*, and is employed successfully as a remedy in dysentery among children, a disease very prevalent in the parts of the country where it grows. The tincture is recommended in cases of ulcerated sore-throat and soreness of the gums, &c. Dr. Bigelow discovered the presence of large proportions of tannin and gallic acid in this plant. The quantity of tannin appears to be greater than that of any other constituent.

G. tuberosum, a plant growing in the south of Europe, particularly in Italy and Silesia, is the γεράνιον of Dioscorides (iii. 121), and the Geranium tertium of Pliny (xxvi. 11).

The hardy perennial kinds of geranium are very beautiful plants, and well adapted for ornamental cultivation. They will thrive in any common garden soil with ordinary care.

(Don, *Gardener's Dictionary;* Babington, *Manual of British Botany;* Fraas, *Synopsis Plantarum Floræ Classicæ.*)

GE′RARD, FRANÇOIS, BARON, one of the most distinguished painters of France, was born of a French father and Italian mother at Rome in 1770. He went early to Paris, and was first placed with the sculptor Pajou, and finally with David, as he found painting better suited to his taste than sculpture. Gérard's first work of note was the blind Belisarius carrying his dying guide in his arms, painted in 1795; it is now in the Leuchtenberg gallery at Munich, and is well known in prints. The next work which attracted notice was Psyche receiving the first kiss from Cupid, which, though extremely elaborate in execution, is an inferior work to the Belisarius: its delicate execution and academical drawing are nearly its only merits; the figures are motionless and lifeless. Cupid and Psyche look like tinted statues; the words of Cicero (*De Nat. Deor.* i. 27) on the Venus Anadyomene of Apelles—that her tints were not blood, but a resemblance of blood—would not apply well to this picture. These however were not the works of the mature artist, and they were followed by many admirable pictures in history, poetry, and portrait.

Some of Gérard's works are among the best and largest oil paintings in existence. His entrance of Henry IV. into Paris, his masterpiece, painted in 1817, is, in more than one sense, a prodigious work: it is thirty French feet wide by fifteen high, and is almost one huge mass of life and character; the drawing is correct, vigorous, and varied, the colouring good, and it is a perfect school of costume for the period: it has been engraved by Toschi. This picture was painted for Louis XVIII. as a substitute for the Battle of Austerlitz, painted by Gérard in 1810, and it procured him his title of Baron. The Battle of Austerlitz, and the Coronation of Charles X., painted in 1827, are of the same vast proportions as the Henry IV., but they are as inferior in execution as in subject. The Battle of Austerlitz is, like many other of the large paintings of Napoleon's battles, little more than a display of military uniforms, though it is superior to the majority of the works of its class, and is equal to its subject: there is an engraving of it by Godefroy. The Henry IV. and the Battle of Austerlitz are at Versailles. The Coronation of Charles X. was nearly destroyed in the revolution of 1830: but had it been entirely so, Gérard would probably have rather gained than lost in reputation; a robe picture is however a poor subject for any painter, but particularly for a great painter.

Of Gérard's small pictures, the best is perhaps Thetis bearing the armour of Achilles, painted in 1822, and purchased by Prince Pozzo di Borgo. The composition and drawing are extremely beautiful; the whole is in the highest degree admirable: there is an engraving of it by Richomme. Two such works as the Henry IV. and the Thetis display rare powers for the same painter; and when we consider in addition that he was constantly engaged in portrait painting, in which he was unsurpassed in his own time, his title to the reputation of one of the greatest painters of modern times is [illegible]. A list of Gérard's portraits would almost amount to a list of the most illustrious personages of his age: Pierre Adam has etched a collection of eighty full-length portraits after him, seven inches and a half by five inches and a half, French—'Collection des Portraits Historiques de M. le Baron Gérard, premier peintre du Roi, gravés à l'eau-forte par M. Pierre Adam, précédée d'une Notice sur le Portrait Historique.'

Gérard died Jan. 11, 1837: he was a member of the Institute of France; a chevalier of the orders of St. Michel and the Légion d'Honneur; and member of the academies of Munich, Vienna, Berlin, Copenhagen, Turin, Milan, and [illegible].

There are many notices of Gérard in the French and German contemporary periodical press—*Kunstblatt*, &c. &c.

GERBIER D'OUVILLY, SIR BALTHASAR, a miniature painter and architect, born at Antwerp about 1591. He came young to England and was a retainer of the Duke of Buckingham's as early as 1613. He accompanied the duke to Spain, and painted a miniature of the Infanta for James I.: he was also employed in the treaty of marriage between Prince Charles and the Infanta Maria, though acting ostensibly only as a painter. He was employed also in Flanders after the accession of Charles I. to negotiate a private treaty with Spain, the same treaty in which Rubens was commissioned on the part of the Infanta, and about which he came to England. In 1628 he was knighted by Charles at Hampton Court; he was naturalised in 1641, and died in 1667 at Hempsted-Marshall, the seat of Lord Craven, which was built by Gerbier himself.

Gerbier was the author of several curious works which are noticed at considerable length by Walpole. One, entitled 'Les Effets pernicieux des meschants Favoris,' &c., he terms 'an ignorant, servile rhapsody, containing little argument, many lies, and some curious facts, if the author is to be believed.' Nσ. 3384 of the Harleian MSS. is entitled—'Sir Balthasar Gerbier, his admonitions and disputes with his three daughters, retired into the English nunnery at Paris, 1646.' One of these daughters was maid of honour to the princess Condé, and passed for her mistress when the princess made her escape from Chantilly, when the prince was imprisoned by Mazarin. There is a portrait of one of Gerbier's daughters, as a little girl, by Rubens, in the collection of Lord Spencer: there are also two pictures of Gerbier's family attributed to Vandyck; one belonging, in Walpole's time, to the Prince of Wales, the other to Mr. Sampson Gideon. Gerbier's portrait in one piece with Dobson the painter and Sir Charles Cotterel, painted by Dobson, is in Northumberland House; there is or was also in the same collection a miniature of the Duke of Buckingham on horseback, dated 1618, by Gerbier himself. In the Pepys Library at Cambridge there is a miscellaneous collection of robes, &c., emblazoned and illuminated by Gerbier. Gerbier appears to have been a courtier, and to have had a lively care for his own interests. He kept in Charles's favour after the death of Buckingham, and he was in favour also with Charles II.: he returned with him to England and designed the triumphal arches which were erected for his reception. He was master of the ceremonies to Charles I., and in 1628 entertained him and the queen at his own house, at a supper, which must have cost at least a thousand pounds, says a contemporary. Gerbier states in one of his works that Charles had promised him the office of surveyor-general of works, after the death of Inigo Jones.

(Walpole, *Anecdotes of Painting*, &c.)

GERMAN SILVER. [Copper, P. C., p. 504.]

GERMEN. [Pistil, P. C.]

GESE′NIUS, FRIEDRICH HEINRICH WILHELM, one of the most distinguished Orientalists of modern times, was born at Nordhausen, on the 3rd of February, 1786. He was educated in the gymnasium of his native place, and afterwards in the universities of Helmstedt and Göttingen. After the completion of his studies, he was for a short time employed as

at the paedagogium of Helmstedt: in 1806 he re-
he post of repetitor in the theological faculty of the
ty of Göttingen. In 1809 Gesenius, on the recom-
on of the celebrated historian Johannes von Müller,
ointed professor of antient literature in the gymnasium
genstadt. This office, however, was of short dura-
in the year following he accepted the appointment
ssor extraordinary of theology in the university of
here, in 1811, he was raised to the rank of ordinary
r. During the war of the Liberation the university
ed, and when it was opened again, in 1814, Gesenius
his former office, and was created doctor of divinity.
the summer of 1820 he made a journey to Paris and
where he collected materials for his great lexicogra-
orks on the Semitic languages. He died on the 23rd
ber, 1842. Gesenius was unquestionably the greatest
of modern times in his particular department of Ori-
erature, and the light he has thrown on the Semitic
es, and especially on the Hebrew, has made a new æra
branch of philology. As a theologian he belonged
to the Rationalistic party, but after the appearance of
s 'Life of Christ' he joined the philosophical and
school, in consequence of which he was often very
attacked by the orthodox party.

works on the Hebrew language enjoy a universal repu-
and some of them are translated into most European
es. The most important among them are—1, 'Lex-
anuale Hebraicum et Chaldaicum in Veteris Testa-
Libros,' 2 vols. 8vo., Leipzig, 1833. This work was
lly written in German, and went through two editions;
rd was made in Latin, and a fourth, in German, ap-
in 1834. 2, 'Hebräisches Elementarbuch,' 2 vols.
The first vol. of this work is a Hebrew Grammar, of
the twelfth edition appeared at Leipzig in 1839; the
is a Hebrew Delectus, and the seventh or last edition
lited after the author's death by De Wette, Leipzig,
3, 'Kritische Geschichte der Hebräischen Sprache
hrift,' Leipzig, 1815, 8vo., is intended as an introduc-
the study of Hebrew; a second edition appeared in
4, 'De Pentateuchi Samaritani Origine, Indole et
tate,' Halle, 1815. 5, 'Ausführliches grammatisch-
es Lehrgebaüde der Hebräischen Sprache, mit durch-
r Vergleichung der verwandten Dialecte,' Leip-
17, 8vo. 6, 'A German translation of the prophet
with a philological, critical, and historical commentary,
, 1820-21, 3 vols. 8vo.; of the first vol. a second
appeared in 1829. 7, 'Scripturae Phoeniciae Monu-
uotquot supersunt edita et inedita ad Autographorum
umque Exemplorum Fidem edidit, Commentariis illus-
&c. parts I.—III., with plates, Leipzig, 1837, 4to.
such über die Maltesische Sprache, zur Beurtheilung
ich wiederholten Behauptung, dass sie ein Ueberrest
Punischen sei,' Leipzig, 1810, 8vo. 9, 'Thesaurus
icus criticus Linguæ Hebraicæ et Chaldaicæ Veteris
nti,' vol i. consisting of two parts, and the second of
ipzig, 1829-42, 4to. A few copies of this work,
in reality an enlargement of the one mentioned above
o. 1, were printed in folio. Gesenius also contri-
reat number of articles on Hebrew and other Orien-
cts to Ersch and Gruber's great 'Encyclopædia.'
geography is especially indebted to him for the notes
added to the German translation of Burckhardt's
in Syria and Palestine,' Weimar, 1823, two

r *Nekrolog der Deutschen* for 1842; Gesenius, *Eine*
ng für seine Freunde, Berlin, 1842, 8vo.)

I. [Mantuano, P. C. S.]

I BERTI. [San Gallo, P. C.]

ON, RICHARD, a celebrated dwarf and painter,
(of the backstairs) to Charles I., was born in 1615.
the pupil of Francis Cleyn, and studied afterwards
ks of Sir Peter Lely, whom he imitated; Lely
his portrait in 1658. Gibson was only three feet ten
igh, and he married, in the presence of Charles and
en, Anne Shepherd, who was of exactly his own
Waller wrote some verses on the occasion.

on appears to have been an excellent painter, especially
r-colours. There is a very good drawing by him of
s the First's queen, at Hampton Court. A miniature
g by him of the parable of the lost sheep was the
of Vanderdoort's death; it belonged to Charles, who
it very much, and he intrusted it to the keeping of
rdoort, who put it away with such care, that when the king asked him for it he could not find it, and he hanged himself in despair; it was found afterwards by his executors and restored to the king. Gibson was patronized also by Philip earl of Pembroke; and he is said to have painted Cromwell several times. He taught painting to the queens Mary and Anne, daughters of James II.

Gibson and his wife were painted several times: by Vandyck, by Dobson, and by Lely. Vandyck introduced his wife in the picture of the Duchess of Richmond at Wilton. They had nine children, five of whom lived to maturity, and attained the proper size. Gibson died in 1690, and his wife in 1709, aged eighty-nine.

(*Essay towards an English School*, 1706; Walpole, *Anecdotes of Painting*.)

GILBERTSOCRINUS, a genus of fossil Echinida, from the mountain limestone. (Phillips.)

GILL, JOHN, D.D., an eminent dissenting divine of the Baptist persuasion, was born at Kettering, in Northamptonshire, on the 23rd of November, (Old Style), 1697. His parents, though in humble life, gave him a superior education in the grammar-school of his native town, until the enforcing of a rule which required attendance upon episcopal worship occasioned his withdrawal, in common with other children of dissenters. He continued his studies in private, and attained considerable proficiency in the Greek, Latin, and Hebrew languages. About the age of twenty he began to preach at Higham Ferrars among the denomination to which both he and his parents belonged, and in 1719 he removed to London, to take charge of a congregation which then assembled at Horsleydown, Southwark, but removed in 1757 to a new chapel in Carter Lane, near London Bridge, over which he presided until his death, on the 14th of October, 1771, a period of more than half a century. Of his numerous publications, which are said to have been equal to 10,000 folio pages, many were of a controversial character and of temporary interest. That by which he is best known is his 'Exposition of the Bible,' published at various times in distinct portions. The 'Exposition of the Song of Solomon' appeared in a folio volume in 1728, and was republished with corrections and additions in 1751 and 1767. In this work Gill replies to Whiston's endeavours to prove the 'Song of Solomon' to be a spurious book. The 'Exposition of the New Testament' appeared in three folio volumes, in 1746, 1747, and 1748, in which last year the degree of D.D. was conferred upon the author from Marischal College, Aberdeen. The Old Testament was completed at various times in six folio volumes, and a second edition of the whole was published shortly before his death. A third complete edition of the 'Exposition' was published in 1809 and 1810, in nine large quarto volumes, with a very copious memoir of the life and writings of Dr. Gill, from which the above facts are derived. Among his other works we may mention 'The Prophecies of the Old Testament respecting the Messiah considered, and proved to be literally fulfilled in Jesus,' published in 1728, in answer to Collins's 'Scheme of Literal Prophecy considered;' a 'Treatise on the Doctrine of the Trinity,' published in 1731, and intended to check a then growing tendency to Sabellianism among the Baptists; the 'Cause of God and Truth,' in four volumes, octavo, published in 1735 and following years, being a defence of Calvinistic against Arminian sentiments, in which Gill displayed a strong inclination to Supralapsarianism; a 'Dissertation concerning the Antiquities of the Hebrew Language, Letters, Vowel-points, and Accents,' 1767, octavo; and a 'Body of Doctrinal Divinity,' two volumes quarto, 1769; and 'Body of Practical Divinity,' one volume quarto, 1770, which were republished together in 1795 in three volumes, large octavo, as 'A Complete Body of Doctrinal and Practical Divinity,' with a portrait of Dr. Gill. This edition, as stated in the advertisement, was published at the request of several ministers, as 'a work which enters into, fully explains, and ably defends the whole system of evangelical truth; a work in which the opinions of the ancient fathers and churches on all the principles, doctrines, and duties of Christianity are critically examined and candidly stated, as are likewise the opinions of the most celebrated philosophers who have been the opponents of Divine revelation.'

GILLENIA, a genus of plants belonging to the natural order Rosaceæ, the sub-order Spireæ. It has a tubularly campanulate 5-cleft calyx, 5 linear lanceolate petals, 10-20 stamens, very short, inclosed in the tube, 5 carpels almost united into a five-celled capsule, and 2 seeds in each cell. There are only two species of this genus.

G. trifoliata has several stems from the same root, a foot or two in height, alternate trifoliate leaves, the flowers, which are few in number, forming a sort of panicle. It is a native of North America in shady places, from Florida to Canada. The root is emetic, and possesses properties similar to those of ipecacuanha. It must however be administered in larger doses, and is not so certain in its effects. Some authors attribute a tonic power to this plant when taken in small doses.

G. stipulacea is distinguished by its foliaceous ovate deeply-cut stipules. It grows in humid woods and damp places from Tennessee to Kentucky, in North America. The medicinal properties of this species are the same as those of *G. trifoliata.*

The species of Gillenia are elegant and hardy plants, and are therefore worthy of cultivation. They grow best in a peat soil, and may be readily propagated by dividing at the roots early in the spring.

(Don, *Gardener's Dictionary*; Lindley, *Flora Medica.*)

GILLIES, JOHN, LL.D., was born on the 18th of January, 1747, at Brechin, in the Scottish county of Forfar. He belonged to a respectable and enterprising family. One of his younger brothers became eminent as a lawyer, and died not long ago, after having been for many years a judge of the Supreme Court in Scotland. Dr. Gillies was educated at the University of Glasgow, where, before he was of age, he taught the classes of the Greek professor, then old and infirm. Soon after this he removed to London with the design of occupying himself in literary labour. But before settling there he paid a visit to the Continent; and on his return he was engaged by the Earl of Hopetoun as travelling tutor to his second son. This young man, while under his care, died at Lyon in 1776; and his tutor's attention to him was rewarded by an annuity for life from his father.

In 1778 Dr. Gillies published his translation of Lysias and Isocrates. He had by that time received his degree as Doctor of Laws; and to this, in later life, he added other literary honours, being a member of several societies in our own country, and a corresponding member of the French Institute and the Royal Society of Göttingen. He next went abroad again with two other sons of the Earl of Hopetoun, one of them the late earl, the other Sir Alexander Hope, who was governor of Chelsea Hospital. Returning to England about 1784, Dr. Gillies published, in 1786, the first part of his 'History of Ancient Greece.' In 1793 he was appointed to succeed Dr. Robertson as Historiographer Royal for Scotland, a sinecure place with a salary of two hundred pounds a year. In 1794 he married. Enjoying a moderate competency, he prosecuted his studies with leisure; and his subsequent writings appeared at long intervals. During his latest years he was very infirm, though labouring under no disease, and had retired altogether from general society. In 1830 he settled at Clapham, near London, where he spent the remainder of his quiet old age, and died on the 15th of February, 1836, of mere decay, having just entered his ninetieth year.

The following are his published works:—1, 'The Orations of Lysias and Isocrates, translated from the Greek, with some account of their Lives; and a Discourse on the History, Manners, and Character of the Greeks, from the conclusion of the Peloponnesian War to the Battle of Chæronea,' 1778, 4to. 2, 'The History of Ancient Greece, its Colonies and Conquests' (afterwards entitled Part the First); 'from the earliest accounts till the Division of the Macedonian Empire in the East; including the History of Literature, Philosophy, and the Fine Arts,' 1786, 2 vols. 4to. This work had reached a sixth edition in 1820, 4 vols. 8vo. There is a German translation of it, 'Geschichte von Altgriechenland,' 11 vols. 12mo., Vienna, 1825. 3, 'View of the Reign of Frederic II. of Prussia, with a Parallel between that Prince and Philip II. of Macedon,' 1789, 8vo. 4, 'Aristotle's Ethics and Politics, comprising his Practical Philosophy, translated from the Greek; illustrated by Introductions and Notes, the Critical History of his Life, and a New Analysis of his Speculative Works,' 1797, 2 vols. 4to. The 'Supplement to the Analysis of Aristotle's Speculative Works, containing an account of the Interpreters and Corrupters of Aristotle's Philosophy, in connection with the Times in which they respectively flourished,' 1804, 4to., was incorporated also in a second edition of the translation published in the same year, 2 vols. 8vo., and in a third edition, the last which has appeared. 5, 'The History of the Ancient World, from the Dominion of Alexander to that of Augustus, with a preliminary survey of preceding periods,' 1807-10, 2 vols. 4to.; reprinted in 4 vols. 8vo. as 'The History of Ancient Greece, its Colonies and Conquests, Part the Second,' 1820. 6, 'A new Translation of Aristotle's Rhetoric, with an Introduction and Appendix explaining its relation to his Exact Philosophy, and vindicating that Philosophy by proofs that all departures from it have been deviations into Error,' 1823, 8vo.

The First Part of the 'History of Greece' appeared in the same year with the first volume of Mitford's work, and, if inferior to it, is yet superior to anything of the sort which our language till then possessed. The plan is well digested; but neither the pompous verbosity of its narrative nor the general dulness of its dissertative portions is likely to secure for it the popularity of which newer views have now robbed it. The translations of Dr. Gillies, however [illegible] their intention, do not deserve high praise. They are everywhere at the very least paraphrastic, and in many places reprehensibly unfaithful. Those from the orators are the least faulty; and for Isocrates the translator's style, elaborate, diffuse, and thoroughly modern in its structure, was on the whole ill calculated. But to Aristotle's works his mode of treatment does great injustice. His desire of popularizing his author has made him depart almost always from his manner of expression; and the same motive, aided not unfrequently either by mistake as to his nomenclature or by the wish to evade a difficulty in the text, has made him often misrepresent even the matter which the philosopher gives him. Indeed this description of their faults is hardly full [illegible] enough, especially in reference to the Ethics and Politics, which he can scarcely be said to have translated at all, so much do his professed translations abound in inaccuracies, in omissions, in unauthorised interpolations. Their defects are exposed, bitterly yet not unjustly, in Thomas Taylor's preface to his version of the Metaphysics of Aristotle. Gillies' version of the Rhetoric is not so bad in the more popular portions; but here also the more abstract passages are very faulty. Two examples may be referred to, which together throw utter confusion over those parts of the Rhetoric that treat the theory of argumentation. He not only falls into the common mistake of holding the Enthymeme to be with Aristotle, as in more recent writers, a name for a syllogism with one premise suppressed, instead of signifying a syllogism in matter contingent; but he repeatedly interpolates this erroneous gloss, and thus causes perplexity where a literal translation would have caused none. Again, in rendering the difficult passages where Aristotle proposes a classification of the kinds of matter which furnish enthymemes (passages probably interpreted rightly by Majoragius and in substance interpreted in the same way by Dr. Whately), he does not even preserve the philosopher's cardinal distinction between the enthymeme from signs and the enthymeme from likelihoods, as arguments of two distinct classes, but slurs over the difficulty by a vague and unmeaning abridgment.

GILLRAY, JAMES, the celebrated caricaturist, was born about the middle of the last century. He was originally a writing engraver, and is said also to have been a strolling player for a short time. He had an acute perception of character, a strong sense of the ludicrous, and at the same time a great ability for drawing, and a practical skill in engraving. His great faculty was the burlesque; his works, however, often contain much wholesome satire. Social abuses and absurd conventionalisms were often the subject of his ridicule; but his pencil was more frequently directed against political abuses; the doings and enactments of the Tory ministers and the events of the great war were his favourite themes. His first political satire was published in 1782, and in allusion to Fox and Lord Rodney's victory. The last of his caricatures appeared in 1809: it represented 'a barber's shop in assize-time,' and was from a design by H. W. Bunbury, who designed several other of the caricatures which were engraved by Gillray. This last plate was executed at intervals between fits of mental aberration, which terminated shortly afterwards in a total suspension of the intellectual faculties, in which state he remained until his death on the 1st of June, 18 His works appeared singly: but they have been published in sets, genuine, and spurious or copies. An 'Illustrative Description,' with a complete set of his genuine works in 304 sheets, was published by McLean, London, in 18 Many of them exceed the bounds of the burlesque, far in the province of the gross and absurd; he also fr took great personal liberties. George III. and Pit of his best characters; Napoleon he has entirely missed,— probably had a difficulty in meeting with his portrait; he is only recognizable by the part he plays; Gillray's caricatures, however, to be thoroughly understood, require a familiarity with the party history of the time; they are mostly works of the day, and Gillray himself was little more than a

rist, unlike Hogarth, a true satirist, whose works are
time.

, or GYN, a machine employed instead of a crane,
by artillerymen, for the purpose of raising guns,
rs, &c. on their carriages. It consists of three round
rom twelve to fifteen feet long, and five inches in
r at the lower extremity, tapering to about three
nd a half at the top.

three poles are, by means of an iron bolt passing
straps, or by a rope passed several times round each,
ogether at their upper extremities in such a manner
y may be turned about their place of union; and
e machine is set up, the feet of the poles are planted
round at about eight or nine feet from each other.
t of two of the poles are kept at that distance by
f a rope or an iron bar, which may be temporarily
n a horizontal position near their lower ends; and be-
e same two poles, at about three feet and a half from
und, is a wooden roller, or windlass, which, by means
spokes, may be turned on its axis, the pivots entering
es sunk in iron cheeks attached to the poles. The
le, commonly called a 'pry-pole,' has a greater extent
ment than the others about the upper extremity, so
the three poles, previously to being set up, may lie on
und: when set up, two blocks with their *fall*, or rope,
loyed in raising or lowering the gun, the upper block
xed to the top of the poles, and the other, by means
e, to the piece of ordnance: the rope from the upper
asses over the windlass before mentioned.

poles fastened together at the top, and set up like the
the letter A, the whole being kept steady by means
es made fast to the upper extremity and to strong
driven into the ground, are also employed for raising
ring artillery, by means of two blocks with their rope,
remity of the latter usually passing round the cylinder
indlass, capstan, or crab. This apparatus is called

KELL, GODART DE, FIRST EARL OF
ONE, was a native of Holland, and the head of a
of great antiquity among the nobility of that country,
he bore the titles of Baron de Reede, de Ginkell, and
which may be read in the peerages, and was a general
lry. He came to England at the time of the Revolu-
1688, either with the Prince of Orange or immediately
When two Scotch regiments, in the beginning of
, 1689, declared for King James and marched from
don, where they were quartered, for Scotland, General
l was sent after them with a body of horse, and soon
k and reduced them. In 1690 he accompanied King
m to Ireland, and commanded a party of Dutch horse
battle of the Boyne (1st July). When the king re-
to England, the conduct of the war was left in the
of Ginkell; and he succeeded in effecting the reduction
country before the end of the following year. The
f Baltimore surrendered to him, 7th June, 1691;
e was taken by storm on the 1st of July; on the 12th
same month he gained the battle of Aghrim [P. C., vol.
]; and on the 3rd of October an end was put to the
the surrender of Limerick. On the 3rd of November
l returned to Dublin, and was banqueted by the
tion; he then came over to England, where, on
h of January, 1692, the Commons ordered seven
ir members to attend him with the thanks of the
, and on the 20th of February he was made a peer
and, with the titles of Earl of Athlone and Baron
hrim. The next week he was entertained at Merchant
s' Hall by the lord mayor and corporation of London.
llowing year the king, after the House of Commons
nt up an address requesting that a recompense might
en to him suitable to his services, made him a grant of
rfeited estates of the Earl of Limerick, amounting to
acres, which was confirmed by an act of the Irish
nent passed on the 7th of December, 1695; but in
n English act was passed appointing a commission to
e into the considerations upon which this and other
grants had been made in Ireland; in the next session
ther act all the lands so granted were vested in trustees
ised to hear and determine upon all claims relating to
and one of the acts of this board appears to have been
umption or invalidation of the grant made to the Earl
lone. Burnet's account however is not very clear:
s, in mentioning the appointment of the board, that the
d sold his estate 'to those who thought they purchased under an unquestionable title; yet all that was laid aside, no regard being had to it; so that this estate was thrown into the heap' ('Own Times,' ii. 239). Afterwards, in giving an account of the proceedings of the House of Commons in 1701, when, the board of trustees having become extremely unpopular, attempts were made to obtain its suppression, he says, 'One motion was carried, not without difficulty, in favour of those who had purchased under the grantees, and had made great improvements, that they should be admitted to purchase with an abatement of two years' value of the estates; the Earl of Athlone, whose case was very singular, as was formerly set out, having sold his grant to men who had reason to think they had purchased under a secure title, a special clause was offered in their favour; but the party had studied so far to inflame the nation against the Dutch, that in this the votes were equal, and, the Speaker's [Harley's] vote being to turn the matter, he gave it against the purchasers.' (Idem, iii. 300.) From this account it would seem that, supposing this vote of the House of Commons to have been conclusive, as appears to be assumed, it was not the Earl of Athlone, but the persons to whom he had sold the lands from whom they were now taken back. The latter, indeed, might possibly have their remedy against the earl as having purchased under what had proved to be a bad title. The account in the common peerages is, that the grant was reversed by parliament (it is not said whether the English or the Irish) on the 15th of December, 1695, or eight days after it had been confirmed by the Irish parliament, and that the value of the estates was appropriated to the payment of the public debts. This is manifestly quite a loose and blundering statement. It is added, that thereupon the family retired to Holland, 'with what feelings of resentment or disappointment,' says Sharp's 'Genealogical Peerage,' 'we are not informed.' The Earl of Athlone, however, continued his military services to the end of the reign of King William. He shared in William's defeat at Landen, 29th July, 1693; and he commanded the Dutch horse in Flanders in 1695 and 1696. He also commanded the Dutch forces serving under Marlborough in the war with France which broke out in 1702, after the accession of Queen Anne. But this post he did not hold long, his death having taken place on the 10th of February, 1703. The Peerages state that the first Earl of Athlone married Ursula-Philipota de Raasfeldt, and had by her two sons, of whom the eldest succeeded to the title. It afterwards, however, fell to the son of the second, who succeeded as the fifth earl in 1747; and his descendants inherited the title till the death of the late lord, without issue, in 1844, when it became extinct. He was the ninth earl. It is remarkable that, with the exception of the first earl, if he ever took his seat, no Earl of Athlone sat in the Irish parliament for more than a century after the creation of the peerage. The family continued to reside in Holland; but Frederick Christian Renaud, the sixth earl, came over here on the French invasion of that country in 1795, and took his seat in the Irish House of Lords on the 10th of March in that year.

GIOCONDO, FRA GIOVANNI, an Italian architect of Verona (of the fifteenth century), celebrated for his almost universal acquirements, was a great Greek and Latin scholar, a theologian, philosopher, and engineer, and was skilled in perspective and in decoration, especially in inlaid wood-work. He is mentioned in the highest terms by many contemporary writers, and particularly by his countryman Julius Cæsar Scaliger, who was his pupil in the Greek and Latin languages. He served the Emperor Maximilian in Germany, Louis XII. in France, and Leo X. at Rome: he built the Ponte della Pietra at Verona, that of Nôtre Dame at Paris, and succeeded Bramante as architect of St. Peter's, the foundations of which he much improved. Vasari mentions other of his architectural works; he also says that he built two bridges over the Seine. He turned a great portion of the waters of the Brenta from the Venetian lagoons, directing them to Brontolo, many miles to the south of Venice, by which means the Venetian waters were kept perfectly free from the vast quantities of mud brought down from the Alps by the Brenta; this Vasari terms Giocondo's greatest work, and a signal service for Venice: the same or a similar channel still exists, and is called the Brenta Nuovissima. Amongst Giocondo's literary services Vasari mentions a great collection of antient inscriptions which he copied in Rome and presented to Lorenzo de' Medici: he also first discovered several of the letters of the younger Pliny in an old library at Paris; and he published an illustrated edition of Vitruvius at Venice in 1511.

In the continuation of St. Peter's, Giocondo was appointed conjointly with Giuliano da San Gallo and Raphael, and the latter speaks of Giocondo in the following terms in a letter (published by Richardson, and inserted in recent Lives of Raphael) to his uncle, dated July 1, 1514:—'He (the pope) has given me a companion, a very learned old friar, who is upwards of eighty years of age; and as the pope sees that he cannot live long, and as he has the reputation of great knowledge, his holiness has given him to me as an assistant, that I may learn of him, and discover any great secret he may have in architecture, and thus perfect myself in the art. He is called Fra Giocondo.' According to this, if Raphael was a correct judge of age, or had ascertained the fact of Giocondo's age, he must have been born about 1430, twenty years earlier than the date given by Vasari. Singularly enough, though not with unusual inconsistency, Vasari, in mentioning Giocondo incidentally in the Life of Raphael, says that he died in 1537, aged eighty-even, yet in Giocondo's own life, which follows soon afterwards, he says, 'He died at length very old; but it is not known exactly when or where.' It is not known with certainty to what religious order he belonged, but he is supposed to have been a Franciscan. He was still living in 1521.

(Vasari, *Vite de' Pittori*, &c.; Dal Pozzo, *Vite de' Pittori, &c. Veronesi*; Milizia, *Opere*; Quatremere de Quincy, *Dictionnaire d'Architecture*, &c.)

GIOFFRE'DO, MARIO GAETANO, one of the few good architects that Naples has produced, was born in that city, May 14th, 1718. Greatly to the dissatisfaction of his parents, who intended him for the law as the most honourable profession, and the most likely to lead to distinction, Gioffredo resolutely determined that architecture should be his pursuit; and he was accordingly placed under Martino Buonocore, an architect of considerable reputation, but of little talent. The pupil was not long in finding out the mediocrity of his master, and commenced a course of private self-instruction by studying the best Neapolitan edifices, those by Fansaga and Domenico Fontana, and the writings of Vitruvius and Palladio. He further extended his studies not only to mathematics, but to antiquities and history in their connection with art, and also took lessons in design and figure-composition, both from Solimena and from Francesco di Mura, another able artist of that time.

Gioffredo at the age of twenty-three began to practise in his profession, but it is unfortunately one which is more or less at the mercy of opportunity, since unless favoured by that, architectural talent has scarcely any means of discovering itself to the public. On one of his visits to Rome he solicited permission to compete for the church of San Giacomo degli Spagnuoli, then about to be rebuilt there: his application was very coldly received by the Spanish dignitary Herreros, who observed that they got their singers and not their architects from Naples; to which Gioffredo replied, he would convince them that Naples had architects also worth having. Nor did he fail to make good his word, for his designs obtained the preference, although he had to contend with Sardi, Fuga, and Vanvitelli, to the second of whom, we may observe, Milizia erroneously attributes the building.

Afterwards, though he had full employment at Naples, and on government works in Calabria Ultra, where he was for some time engaged in superintending the working of the iron-mines in the Valle di Canneto, he had not many opportunities of signalizing himself as an architect. The principal buildings of architectural note by him at Naples are the two palazzi Campolieto and Coscia, and the Chiesa dello Spirito Santo; for though great public improvements, the two new streets, that of Monte Oliveto and the one called De' Pellegrini, do not properly come under the head of architectural works. Still, had he even executed less in the practice of his profession, he would possess a claim to notice which is shared by comparatively very few in it, for he published an excellent work on architecture in 1768, which however he did not carry on to the extent he originally contemplated, on account of the very great expense for engravings which it would have imposed upon him.

In 1783 his services were rewarded by his being appointed the chief government architect, with a very liberal salary. Soon afterwards a disorder of his eyes, brought on by excessive study, terminated in total blindness. In that condition his only solace was derived from the talents of his four daughters, all of whom were most accomplished musicians. He fell at last into a state of profound melancholy, from which death relieved him on March 8th, 1785.

GIRAUD, COUNT GIOVANNI, one of the best and most popular writers of Italian comedy, was born at Rome, October 28th, 1776, and was of a noble and wealthy family that had been originally of French extraction. Of his first studies and his early passion for the drama and everything connected with the theatre, he himself has given an amusing account in the general preface to his comedies. When he was at the age of sixteen, the death of his father, Count Ferdinando, left him to frequent the theatre without restraint. Even before that time he had begun to compose dialogues and scenes in imitation of Goldoni, Chiari, and other dramatists, but it was not till some years afterwards that he composed his first regular piece, 'I Gelosi per Equivoco;' nor was that performed till 1807. Its decided success inspired him afresh with inclination to write for the stage, which had been rather damped by the discouraging remarks of the manager to whom it had been first offered; and in the very same year he produced his 'L'Ajo nell' Imbarazzo' (The Tutor in a Scrape), which is universally allowed to be his masterpiece, and one of the happiest specimens of modern Italian comedy. In 1812 he went to Paris with his elder brother Pietro, and he again visited France in 1815, after the restoration of the Bourbons, and also came over for a short time to England. On his return to Italy he published (1818) his 'Teatro Domestico,' and produced some fresh pieces for the stage, but was soon after seized with a strange fancy for entering into mercantile speculations and other schemes, which, besides diverting him from the career in which he had distinguished himself, failed so completely, that he was at length reduced to comparative poverty. His disappointment greatly affected both his health and his mind; he fell into a declining state, and was at last carried off by a severe nervous attack in the spring of 1834.

Giraud possesses more of comic power than is displayed by any of his contemporaries; he exhibits more of incident, situation, and stage effect; and if his dialogue seldom rises above the level of ordinary conversation, it is at least marked by vivacity, and is free from that drawling flatness which is one great defect of modern Italian comedy. Some of his pieces were founded upon real circumstances, and in one instance this brought him into a very serious dispute with the family of the Marchese Albergati (another celebrated dramatist), for his 'Sospetto Funesto' was supposed by them to allude very undisguisedly to an unfortunate domestic affair, and the suspicious circumstances attending the sudden death of the marquis's second wife. The piece was in consequence prohibited; nor does it appear to have ever been published. To all of those which he did publish he prefixed a separate preface, which self-commentaries possess a value and interest of their own.

GIRDER. [Trussing, P. C.; Floor, P. C. S.]

GIRODET TRIOSON, ANNE LOUIS, one of the most celebrated of the recent French painters, was born at Montargis on Jan. 5, 1767, and was the favourite pupil of David; he studied also some time in Italy. His name was really Girodet; he adopted that of Trioson in 1812, from his guardian, a physician. His first picture of note was the Dream of Endymion, painted in Rome; and in 1806 he created considerable sensation by his large picture of a scene from the Deluge, now in the Louvre, a composition exceeding all limits of probability, quite void of true dramatic character, dead in modelling and in colour, and good only in the academical outline of the figures, which, however, though about to fall headlong, are motionless: the only support of a whole family of five is a broken branch, held by one arm of the father, who is carrying an old man on his back; the group has just lost its equilibrium, yet the branch is completely broken and bent about eighty degrees from its natural position, in which it must have been completely out of the reach of the father, or once reached there could be no possible danger of the group falling, as it must have been planted far and firmly upon the rock. The whole composition is an example of the awful made ridiculous by bad treatment.

There are three other works by Girodet in the Louvre,—the Endymion, the Burial of Atala, from Châteaubriand, and the Revolt of Cairo, an extremely extravagant composition. Girodet's chief merits are an elaborate execution — an academical beauty of design; but it is generally a cold lifeless beauty. One of his best pictures is Pygmalion and his Statue, in the Somariva collection, which is remarkably chaste and beautiful in composition and execution, and it is a subject which does not suffer from Girodet's peculiar style: it has been engraved by Laugier.

st of the best works of Girodet have been well en-, as well as a vast number of designs for publishers. A ion of literary works, also by him, was published in under the title 'Les Œuvres posthumes, Poétiques et iques, de Girodet Trioson,' in 2 vols. 8vo., containing ife and Correspondence.

det was a member of the Academy of Painting and of titute of France; a knight of the order of St. Michael, cer of the Legion of Honour: he died December 9, A sale of his effects was made after his death, when his drawings realised enormous prices.

VAN, a market and post town and burgh of barony coast, in the district of Carrick, in Ayrshire, about s south-south-west from Ayr, and about 54 miles uth-west from Glasgow. The parish of Girvan about nine miles along the shore, and on the average ur miles inland, having thus an area of about thirty- re miles, or above 23,000 statute acres: it is traversed ge of hills having an average elevation of 900 feet, ng in one place to 1200 feet, and is watered by the Water and one or two other small streams. The ontains a considerable quantity of good arable land in er ground, yielding, according to an estimate made in bout 3800 quarters of oats, 2600 quarters of wheat, 000 bolls of potatoes. There are about 800 or 900 cattle, chiefly cows for the dairy, and above 2100 There is a considerable salmon-fishery at the mouth Girvan; and the bay of Girvan affords a variety of ex- fish, such as cod, haddock, whiting, mackerel, soles, rs, turbot, and lobsters; but no attempt has been made this supply to much account. Some limestone is dug; ore has been found, but is not now worked; nor is y coal in the parish, though there is in the neighbour- The town is beautifully situated, and commands a fine the sea, with the peninsula of Cantire, the islands of nd Bute, and other islands, Ailsa Craig, and the coast and in the distance. It is an ill-built mean-looking nd consists in great part of small houses, one story ontaining a weaving-shop and a room to live in, the ometimes tenanted by several families. The popula- nsists chiefly of hand-loom weavers and their families; er of them are Irish immigrants, wretched in condition, and dirty in their habits, and destitute of that fore- and independence of character which mark the native ion. There are a parish church, a Secession meeting- small Methodist meeting-house, used in the week as l-room, and a small school-room, used as a Roman chapel. The population of the parish at the different tions in the present century was as follows:—1801, 1811, 3097; 1821, 4490; 1831, 6430; 1841, 7424; 3662 males, 1918 of them under twenty years; and males, 1842 of them under twenty. The number of in 1841 was 1099, namely, 1069 inhabited, 26 unin- and 4 building. Only about one-tenth of the popu- s agricultural. There are two branch banks; and rn is shipped from the quay, which is small. It is that a good harbour might be formed at a moderate There are a parish school, a subscription school for the children of the poor to read at 1*d.* per week, ny private schools, both in the town and in the rural the parish. There are a small subscription library, a belonging to the Agricultural Society of the district, culating libraries, and a number of benefit societies savings-bank. Girvan was erected into a burgh of in 1696, by charter granted to Sir Andrew Muir. A ourt is held weekly for debts not exceeding 2*l.*

Statistical Account of Scotland; Gazetteer of Scot- ablished by Fullarton and Co., Glasgow, 1842; *Popu- Returns.*)

CIER. Attention has been of late so strongly to the mechanical theory of glacier movements and ssible geological effects of such movements, that it s necessary to add a few lines to the notice of glaciers n a former volume. [GLACIERS, P. C.] The hypotheses ch the descent of the vast masses of frozen snow down lleys of the Alps and other mountainous regions has xplained, or attempted to be explained, are essentially First, the original notion of Saussure, put in its most l form, that the glacier masses descended the valleys *force of gravity*; and secondly, the later notion of ntier, that the icy masses were *pushed* down the by an internal expansion caused by congelation of in their internal cavities. Each of these original notions takes at least two forms. Saussure's hypothesis, indeed, appears in three modifications of importance.

1 A. The view of Mr. R. Mallet, communicated to the Geological Society of Dublin, recognises the descent of the glacier by gravity, but adds the hydrostatic pressure of water below the glacier—*upward* and *forward;* and it is impossible to deny to this speculation the merit of removing some considerable difficulty in the reception of the general hypothesis of Saussure.

1 B. The view of Professor J. Forbes, who, besides noticing peculiar structures (the blue bands) in the glacier ice, and measuring the velocity of glacier movements in different parts of the valley, and in the central and lateral parts of the 'ice current' (if we may so speak), has proved the *bending* of the ice from a straight transverse line during its movements; and has, by means of artificial preparations, imitated some of the peculiar glacial structures. His view is, that glaciers descend the valleys in consequence of so much mutual yielding and adjustment (plasticity) of their parts as to entitle them to be regarded as *viscous* or *semifluid masses*, flowing slowly under the influence of gravity.

1 C. Mr. Hopkins, recurring to the original notion of Saussure, maintains the mechanical probability of the glaciers *sliding down* their containing valleys, as *solid* bodies; that is to say, sliding in consequence of the general slope of the valley, and not in consequence of the internal displacements and readjustments of the icy mass. Displacements and readjustments happen in this view no less than in Mr. Forbes's hypothesis. The icy mass is subject to *extension*, to *flexure*, and *fracture* under *tension*, and a variety of accidents, which Mr. Hopkins has employed to explain the unequal rates of movement, the varying forms of fissures, &c. in glaciers. Ice may be regarded as in a certain degree plastic, since it is flexible; bnt none of these things interfere with the essential condition of this hypothesis, viz., the *sliding* of the whole ice-mass on its bed. This sliding is in a great measure due to the perpetual slow fusion of the lower surface of the ice, which leaves it in a constant state of disintegration, &c. Mr. Hopkins has made experiments on the sliding of ice; from which it results, that even at angles of inclination from the horizon much below 1°, the movement of the ice masses on a rough flagstone, while the lower surface was subject to slow fusion, was very discernible, and found to follow a simple law proportioned to the sine of the angle of inclination.

2 A. The second branch of the hypothesis alluded to, originating with Charpentier, has further ramified into two forms. Charpentier thought the congelation of water in many *fissures* of the glacier must necessarily urge portions of it forward in the direction of least resistance. But as the glacier is sliding by day and by night, in summer and in winter, sliding unequally in different parts of its descent, and not with such *an order of inequality* as fits to the hypothesis; and as there is no assignable reason (in this hypothesis) for the formation of new *fissures*, and the continuation of the process, this whole speculation (the *dilation* hypothesis) has been abandoned.

2 B. Another form has been given to it by M. Agassiz. This eminent explorer of the Alpine glaciers ascribes their onward movement to congelation of water, not in the cavities of Charpentier, but in minute capillary fissures and spaces among the granular constituent masses of the glacier. With such a power of expansion, altogether independent of gravity, M. Agassiz esteemed it possible to allow of the movement of glaciers, even across level countries, and thus to account for many geological phenomena difficult to be otherwise explained, as erratic blocks and other diluvial phenomena. Mr. Hopkins has, however, conclusively shown that by the means supposed no such power of onward movement can be exercised. Mr. Forbes has proved the actual phenomena of glaciers to be inconsistent with the assumption of such congelation as a cause and with the effects ascribed to it by Agassiz. It is clear from all experiments and mechanical reasonings, that gravity causes the descent of glaciers; but there remain some further researches to be made into the true internal structure of ice, and the true state of the lower surface of glaciers, before we can regard the inquiry as complete.

The geological interest attaching to a correct theory of glacier movements is considerable.

The investigations of Agassiz and others into the history of the glaciers of the Alps, &c., and their former greater extension, have rendered it very probable that this enormous ice-power has been actively at work in early geological periods in situations where now no fields of ice ever occur. Observations of effects such as glaciers are known to produce on surfaces which they traverse; smoothed and rounded rocks—grooved surfaces—striation parallel to the grooves,—appear to require the existence and movement of glaciers down some of the valleys which intersect the Snowdonian, the Cumbrian, and Irish mountains. One of the effects attendant on glaciers is the transport of detritus on the surface of the ice till it melts, or, in the case of the glacier meeting the sea, breaks off in an iceberg to be drifted by oceanic currents. It is believed by Agassiz that the immense single blocks of stone which lie on the Jura, opposite the valleys of the Alps, have been deposited there by glaciers, not drifted by water-currents, and this speculation he has applied to far greater areas and more difficult cases, such as the accumulation of erratic blocks, gravel mounds, and diluvial heaps in level regions like those which margin the antient tertiary Bay of Dublin, or abound in the central plains of England. From so great an extension of this speculation, founded as it is on an erroneous hypothesis of glacial movement, Mr. Hopkins's demonstrations warn us to dissent; but if, as may be easily believed, the antient glacier streams of Cumberland delivered the detrital blocks of Shap and Carrock into the sea by the breaking off of icebergs, these may have been drifted by currents to Staffordshire, to the mouth of the Tyne, and the valleys of York and Holderness.

It may be objected that for such an icy covering to Snowdon and Skiddaw, a great reduction of climate is necessary, and that this is not consonant with the general tenor of geological inferences, which point to more elevated temperatures in early periods. But the reply is easy. The evidence of warm climates in northern zones relied on by geologists applies to *far earlier periods*; and in respect of this comparatively late period, a reduction of temperature to the extent required for the production of glaciers on the mountains of Wales and Cumberland is perfectly possible by a mere change of the disposition of land and water—since in fact the temperature of the British Islands is now *in excess* above the mean of their latitude by 5°, 10°, 15°, and more, and this excess is merely due to oceanic currents and other conditions which vary with the distribution of land and water.

(Saussure, *Voyages dans les Alpes*; Mallet, in *Trans. of the Dublin Geol. Soc.*; Forbes, in *Jameson's Journal and Tour in the Alps*; Hopkins, in *Cambridge Trans. and Phil. Magazine.*)

GLASS, JOHN, founder of the sect of Glassites in Scotland, was born on 21st September, 1695, at Auchtermuchty, a parish in the county of Fife, of which his father was clergyman. He studied at St. Andrews and Edinburgh, and in 1719 was ordained minister of the parish of Tealing near Dundee. He became a popular preacher, and his sermons, extending to two or three hours in length, were attended by crowds of people from distant parts of the country. He exhibited his disposition to differ with the other members of the church of Scotland, by attacking the principles of the Solemn League and Covenant, and other public declarations intimately connected with the growth of the Presbyterian polity. He was deposed by the church courts on 12th of April, 1728. His position being re-considered by the Genera Assembly of 1739, it would appear that they decided that he was entitled to retain his status as an ecclesiastical person, but not to hold a benefice, as he refused to comply with the necessary tests. He had in the mean time removed to Dundee, where a few hearers gathered round him, and, gradually accumulating, formed a considerable sect. It is not easy from any known announcement of them to discover their tenets; they have a mystical appearance, and relate to a spiritual union which binds the members into one body as a church, without its being represented by an outward ecclesiastical polity. The Glassites are generally respectable people, and their founder lived an unspotted life. He died in 1773.

(Chambers, *Biog. Dict. of eminent Scotsmen.*)

GLASS PAINTING is practised as follows:—The design having been first drawn on paper, the glass is laid thereon, and the outline traced on the glass with black or brown composed of a very fusible glass, coloured with a metallic oxide, and ground extremely fine in oil of tar or spike. The parts intended to be yellow, orange, or red are then coated, either on one or both sides, according to the tint required, with a mixture composed of an alloy of silver and antimony ground up with the red oxide, which is obtained by subjecting sulphate of iron to a red heat. The glass is then exposed to a red heat, or, as it is termed, fired, in which process the tracing-colour is fused, and adheres permanently to the glass. The mixture of silver and antimony stains the glass, but does not melt, so that the oxide of iron, which is in the state of dry powder, may be brushed off, leaving the glass coloured, but as transparent as before. The other colours, composed for enamel [ENAMEL, P. C.], of a very fusible glass coloured with metallic oxides, are then added, and the glass is again fired. In most cases the glass is fired between the applications of each colour, as some colours require more heat than others. In subjects which are too large to be executed in one piece, the joinings are carefully arranged to run in the outline; and for draperies, &c. the artist avails himself of glass already coloured in the manufacture (pot metal), and which requires shadowing, diapering, &c.

In painting glass, the colours applied remain on the surface of the glass, and interfere with its transparency. In staining glass, the colour sinks into the glass a very small distance, but leaves it as transparent as before: the only colours which can at present be stained are yellow, orange, and red.

There is a kind of ornamental window-glass called matted work, in which the glass is covered with a very fusible composition, either white or tinted, previously reduced to an impalpable powder. This composition is then removed from certain parts of the glass, according to the required pattern, and, after firing, produces on the glass a dull ground with a bright pattern. The demand for ornamental glass having increased lately, several persons have attempted, some by stencilling, others by the application of machinery, to produce it at a cheap rate; and matted work can now be obtained at one-fourth of the price that would have been charged a few years since.

There is also another method of ornamenting glass, rather inappropriately termed embossing, which also consists of a bright figure on a dull ground. The parts intended to be bright are painted over with varnish; hydrofluoric acid is then poured on, which etches the glass to a certain depth. After the acid and varnish are washed off, the glass is ground by rubbing with another piece of flat glass and fine emery. This process removes the original surface of the glass, and produces the dull ground; and the design, having been sunk by the action of the acid, is untouched in the grinding process, and left bright.

GLAUCIUM (from γλαυκὸς, 'sea-green, or glaucous,' in allusion to the colour of the plant and its habitation by the sea-side), a genus of plants belonging to the natural order Papaveraceæ. It has two sepals, four petals, and indefinite stamens; elongated 2-valved capsules, a bilamellate stigma, and ovate reniform seeds. The species are evergreen glaucous biennial or annual herbs, abounding in a copper-coloured acrid juice, said to be poisonous and to occasion madness. The flowers are yellow or crimson, and the English name of the genus, Horn Poppy, originates in the horn-like shape of the pods.

G. luteum, Yellow-horned Poppy, has a smooth stem and a tubercular scabrous pod. The flowers are large, and of a golden-yellow colour. It is found on the sandy sea-shores of Great Britain, and also in the Carolinas and Virginia. It is the *μήκων κερατῖτις* of Theophrastus (*Hist. Plant.*, 9, [illegible])

G. phœniceum is regarded by De Candolle as a variety of *G. corniculatum*. It is a native of the south of Europe, and is occasionally found on the coast of England. It is however considered by Babington to be a doubtful native. The flowers are crimson, and have an elegant appearance. Don enumerates six species of Glaucium, none of which however are applied to any useful purposes. The species of horn-poppy thrive well in any common garden-soil, and may be easily raised from seeds, which ripen in great abundance.

(Don, *Gardener's Dic.*; Babington, *Man. Brit. Bot.*)

GLAUX, a genus of plants belonging to the natural order Ranunculaceæ. It has a bell-shaped calyx, 5-parted, coloured, and without any corolla, by which peculiarity it is distinguished from all other plants of the same order. There are 5 stamens inserted at the base of the calyx; the capsules are few-seeded, opening with 5 valves. There is but one species of this genus.

Glaux maritima, the Black Saltwort, has a procumbent stem, opposite ovate glabrous leaves, axillary sessile pink flowers with obtuse segments. It grows on the sea-shore and salt-m and is a native of Great Britain.

(Babington, *Manual of British Botany.*)

GLEANING. The practice of gleaning in corn what the reapers of the harvest leave behind is vulgarly posed to be a legal custom which the 'owner or occup the field has no right to prohibit, and that the poor who a field for this purpose are not guilty of trespass;' bu only authority in support of this view is an extra-ju

of Lord Hale. Blackstone, in his 'Commentaries,'
i. c. 12, remarks that this humane provision seems
ed from the Mosaical law (*Levit.* xix. 9, and xxiii.
), and apparently adopts Lord Hale's opinion. The
n has, however, twice been tried in the Court of
on Pleas. In the first case the defendant pleaded that
g a poor, necessitous, and indigent person, entered the
f's close to glean; and in the second the defendant's
as the same, with the addition that he was an inhabitant
settled within the parish. Mr. Justice Gould gave a
nt in favour of gleaning; but the other three judges
decided that the claim had no foundation in law, and
was a practice incompatible with the exclusive enjoy-
f property, and was productive of vagrancy and many
vous consequences.' (1 H. Bl., *Rep.* 51, quoted in
n's ed. Blackst., *Com.*, vol. iii. p. 213.)

general custom in all parts of England is to allow the
glean, in some cases before the harvest is carried, but
nerally perhaps not until afterwards. Persons who
actually necessitous sometimes avail themselves of per-
to glean, and by commencing their labours as soon as
light, they gain as much as they would have done
e wages which they would have earned if they had
ployed by the farmer to secure the crop. In this
privilege is abused, and the community not benefited.
districts the farmers meet together and establish rules
lating the practice of gleaning, with a view of pro-
themselves, and likewise of confining the privileges to
ssitous poor of the neighbourhood. The following
s which were agreed upon at a meeting of farmers in
dshire, 11th August, 1845:—1, That no person shall
red to glean in any field, until the day after the corn
ave been carted and the field cleared; 2, That no
be allowed to enter the fields for the purpose of
g until after eight o'clock in the morning, or to remain
after six o'clock in the evening; 3, That no able-
labourer above sixteen years of age and under sixty
allowed to glean in any of the fields situated within
ishes [above named]; 4, That any person or persons
reaking the rules laid down in the foregoing resolutions
considered a trespasser, and prosecuted accordingly.
e cases the only restriction is as to the hours when
g is allowed; and this is a very proper one, as in the
of any rule gleaners have been known to commence
three o'clock in the morning, that is, before daylight,
ile the crop was still in the field.

following table is from a paper prepared by Dr. Kay
worth, on the earnings of agricultural labourers in
and Suffolk (*Journal of Statistical Society of London*,
p. 183), and it professes to show the value of corn
by 388 families:—

	Average number of Children in a Family.	Average Annual Amount.
lies with no children . .	..	£0 17 10½
„ all the children under 10	2$\frac{7}{8}$	0 18 7½
„ one child above 10 .	3$\frac{7}{10}$	1 0 6¼
„ two children . .	4$\frac{3}{10}$	1 5 6½
„ three . . .	5¾	1 9 6¼
„ four . . .	7	1 6 9½

al value of gleanings of the 338 families was 423*l.* 12*s.*,
average for each family 1*l.* 1*s.* 10*d.*, which was one-
the average harvest wages of each of the same number
ies.

DITSCHIA, a genus of plants named in honour of
Gleditsch, a professor at Berlin, and author of a work
sexual system of Linnæus entitled 'Consideratio
os Siegesbeckianae in Linnaei systema plantarum
et methodum botanicam.' (Bischoff, p. 562.) He
ood botanist, and contributed a valuable paper on the
ctive organs of the Fungi to the Transactions of the
Academy in 1748. This genus belongs to the natural
eguminosæ and the suborder Cassieæ. The flowers
sexual, the calyx has 3-4-5 equal sepals, which are
ed together at the base into a cupule. The petals
al in number to the sepals; two of them are connected
arina. The leaves are abruptly pinnate and bipinnate
same tree. The flowers have a greenish colour, and
osed in spikes.

iacanthos, the Three-horned Acacia or Honey Locust, is
tree, native of the Carolinas and Virginia, and attaining
t of from 50 to 80 feet. When the tree is young, the
nd branches are covered with small prickles, which
hard as it increases in age, and form a formidable defence. The foliage is of a light shining green, and is particularly elegant. In the neighbourhood of London the leaves do not appear until late in the spring, and drop off early in the autumn. The seeds are covered with a sweet pulp, which, when infused and fermented, forms an intoxicating liquor which was used by the American Indians.

G. monosperma, the One-seeded Gleditschia, is a native of the Carolinas, Florida, and Illinois, in damp woods. It attains a height of from 60 to 80 feet, and much resembles the former species. When none of the seeds ripen it is impossible to distinguish them. There are 8 species of Gleditschia enumerated, all of which possess the same general characters. As ornamental trees they are much esteemed, both on account of their elegant foliage and the varied and picturesque forms assumed by the tree, together with the singular appearance of the spines. They require a deep rich soil in a situation not exposed to high winds.

(Loudon, *Encyclopedia of Trees and Shrubs*; Don, *Gardener's Dictionary*.)

GLEEMAN'S SONG. [SAXON LANGUAGE AND LITERATURE, P. C.]

GLYCE'RIA (from γλυκερός, sweet), a genus of plants belonging to the natural order of Grasses and the tribe Festucineæ. It has unequal acute submembranous glumes, the outer palea with 5-7 strong, prominent, distinct and parallel ribs and a scarious margin, subcylindrical, unarmed; the styles terminal. The species are handsome grasses with long stems, and mostly inhabit watery places. There are two species found in Great Britain, *G. aquatica* and *G. fluitans.* They contain a large quantity of saccharine matter, but are coarse grasses.

(Babington, *Manual of British Botany.*)

GLYCERIN. [CHEMISTRY, P. C. S.]

GLY'CINE. [WISTARIA, P. C.]

GLY'PHIS, a genus of fossil Placoid fishes, from the London clay. (Agassiz.)

GLYPTOCE'PHALUS, a genus of fossil Cycloid fishes, from the London clay. (Agassiz.)

GLYPTO'STEUS, a genus of fossil Ganoid fishes, from the old red-sandstone of Elgin and Clashbennie (Agassiz): two British species.

GLYPTOGRAPHY. [ELECTRO-METALLURGY, P. C. S.]

GNAPHA'LIUM (from γνάφαλον, which signifies the wool which the fuller cuts off in fulling the cloth), a genus of plants belonging to the natural order Compositæ, to the suborder Corymbiferæ, the tribe Senecionideæ, the subtribe Gnaphalieæ, the division Helichryseæ. It has the ray florets pistilliferous, the centre with both stamens and pistils, all of them tubular; the pappus capillary; the receptacle flat, naked; the involucre hemispherical, imbricated; the scales equalling the florets, but not mixed with them. The corolla of the outer florets is often obsolete. The species of this genus have a soft pubescent foliage with dry flowers, which keep for a long time without perishing, and, like those of some species of Helichrysum and Xeranthemum, are called 'everlastings' or 'immortal' flowers. The species are numerous. Five are British. Of these *G. siliquosum* is the most common, growing in wet and sandy places. *G. luteo-album*, *G. sylvaticum*, *G. supinum*, and *G. pusillum* are all rare plants. Several of the species of the old genus Gnaphalium are referred to new genera as Antennaria and Filago. *G. dioicum* is *Antennaria dioica* of Gærtner. It grows on mountain heaths in Great Britain, and is commonly called cotton-weed, and by the older herbalists *pes cati.* Its flowers were admitted into the older pharmacopœias under the name of *Flores hispiduli pes cati.* They are astringent, and were employed in the cure of hooping-cough, phthisis, and hæmoptysis. *G. arenarium* (*Helichrysum arenarium*) has been employed as a remedy in dyspnœa. *G. Stæchas* of Linnæus, Goldilocks, the *Helichrysum Stæchas*, is mentioned by Theophrastus (*Hist. Pl.* 9, 21). The flowers of this plant were formerly much used in medicine, but are seldom employed at the present day.

(Babington, *Manual of British Botany*; Burnett, *Outlines of Botany*; Fraas, *Synopsis Plant. Fl. Classicæ.*)

GNETA'CEÆ, a natural order of plants belonging to the small class of Gymnosperms. The species consist of small trees very much branched, or of sarmentose shrubs with opposite or clustered branches, and thickened separable articulations. The leaves are opposite, entire, with pinnate veins, sometimes very minute and scale-shaped. The ligneous tissue of the wood is marked with circular disks. The flowers are monœcious or diœcious; the stamens are contained in a 1-leaved calyx; the ovary is perforated at the apex, containing in a single cavity a solitary erect ovule; the ovule pointed by a style-like process, formed from the membrane of the nucleus; there is no trace of a style or stigma.

This small order of plants has been formed by Blume, whose memoir in the 'Annales des Sciences Naturelles' contains the principal knowledge we have of this order. 'This little family,' he says, 'constitutes a part of that natural class of vegetables in which the fertilization of the ovule takes place immediately, without the aid of style or stigma, through the foramen of the ovule itself. Through Ephreda, which has hitherto been placed with Coniferæ, the order is closely connected with the latter: and, on the other hand, it tends towards Casuarinaceæ, plants of a higher degree of organization; since Gnetaceæ is beyond all doubt an instance of a more perfect kind of evolution than either Coniferæ or Cycadaceæ. From both these orders Gnetaceæ differ in the greater perfection of their sexual organs, especially of their stamens; and at the same time their ovules are not absolutely naked, but covered with a pericarpial integument pierced at the summit. In the male flowers the perianth is tubular; at first quite closed up, in the manner of certain Artocarpeæ, but eventually it is ruptured by the rising of the stamen. There is no trace of a perianth of this sort in the neighbouring orders; but in Coniferæ a totally different organization of anther occurs, that part not opening, as in Gnetaceæ, by transverse pores of the apex, but always at the side, and generally longitudinally.'

The species of this family are natives of the temperate parts of Europe, Asia, and South America. Gnetum is an inhabitant of the hottest parts of India and Guiana.

Some of the species of Gnetum are used as food. The seeds of G. Gnetum are eaten in Amboyna, and are roasted, boiled, or fried. The green leaves are cooked and eaten like spinach. The inside of the fruit of *G. urens* is lined with stinging hairs; the seeds are, however, eaten: the stem exudes a transparent gum, and when cut across yields a large quantity of transparent water, which is drunk.

(Lindley, *Natural System of Botany*.)

GO'BIUS, a genus of Acanthopterygious osseous fishes, belonging to the family *Gobioidæ*. All the species have two dorsal fins, scaly bodies, and a disk beneath the throat formed by the united ventral fins. By means of this disk they have the power of attaching themselves to rocks. Several species of Goby are met with on the British coast. The largest is the *Gobius niger* of Linnæus, which attains the length of six inches, and ranges from Cornwall to the Orkneys. Mr. Couch has inquired into the habits of the black Goby, and finds that when it has seized its prey it carries it off alive in its mouth to its resting-place, which is among rocks. The other British Gobies, *G. bipunctatus*, *G. minutus*, *G. gracilis*, and *G. unipunctatus*, are mostly inhabitants of sandy ground. On the shores of the Mediterranean Gobies abound, and are also found in deep water, even to a depth of fifty fathoms. The deep-water species are distinct from those frequenting the coast-line.

The species of *Gobius* are very tenacious of life, and are capable, like their neighbours, the Blennies, of living some time out of water. The most remarkable fact connected with the history of these fishes is their nidification. That the Goby built a nest was known to the antient Greeks. This nest they construct in spring, of seaweeds, &c., and in it the female deposits her eggs, whilst the male watches over them until they are hatched. The nest of the Goby is very well built, and has of late been observed on our own coasts. True Gobies occur in the seas of the southern hemispheres as well as in those of the northern.

GOES, HUGO VANDER, a celebrated old Flemish painter and pupil of John Van Eyck. He was a native of Bruges according to Van Mander, but of Antwerp according to Vasari, who calls him Hugo d'Anversa. He spent some time in Italy, and after his return to the Netherlands appears to have settled in Ghent. He conducted the festival which was held at Ghent at the inauguration of Charles the Bold as Count of Flanders, on July 27, 1467. In 1473 he painted the decorations for the pope's jubilee; and he was, according to the town archives, frequently employed by the authorities of Ghent down to the year 1480. The cause of his residing in Ghent is conjectured to be a supposed marriage with a beautiful maid of that place, the daughter of a citizen of the name of Jacob Weytens, in an apartment of whose house Vander Goes painted in oil a celebrated picture of David and Abigail, in which he introduced the portrait of the daughter with whom he was in love, beautifully painted: it has been celebrated in verse by Lucas de Heere, but has since perished. Vander Goes seems to have survived his supposed wife, for, probably about 1480, he entered the Augustine convent of [illegible] in the wood of Soignies near Brussels, in which he became canon; he was buried there, and the following inscription is written over his tomb:—

> "Pictor Hugo Van der Goes humatus hic quiescit.
> Dolet ars, cum similem sibi modo nescit."
> (Swertius, *Monumenta Sepulcralia*, &c.)

There are many extant works attributed by various writers to Vander Goes, but few with certainty: the Museum of Berlin has eight; there are four at Munich, and several at Vienna and in the Netherlands. Passavant thinks that the two large pictures of James IV. of Scotland and his queen, with the Saints Andrew and George, at Hampton Court (No[illegible] 510), are by Vander Goes, because they are similar to his pictures at Berlin; but they are much more likely to have been painted by Mabuse, to whom they are attributed, and who was in this country in the reign of Henry VII., James's father-in-law: James also was not married until [illegible], when Vander Goes had probably been dead some time.

One of Vander Goes' masterpieces is the Crucifixion between the two thieves, in the church of St. James at Bruges, which, to preserve it during the iconoclastic rage in the sixteenth century (1566), was coated with black and inscribed with the ten commandments: it was afterwards cleaned, and still remains.

Vander Goes excelled in painting women, but he appears to have been unequal in his execution. His best works are conspicuous for the beauties of the Van Eyck and old Flemish school—colour and careful execution, with its prim postures and meagre forms.

(Van Mander, *Leven der Schilders*, &c.; De Bast, *Messager des Sciences et des Arts*, Gand, 1824; *Kunstblatt*, 1826; Passavant, *Kunstreise*, &c.; Rathgeber, *Annalen der Niederländischen Malerei*, &c.)

GOLD-BEATERS' SKIN. The preparation of the delicate membrane known by the name of 'gold-beaters' skin' forms part of an exceedingly dirty and disagreeable class of manufactures called by the French 'boyauderie,' from the word 'boyau,' intestine. The strings for violins, harps, and guitars [CATGUT, P. C. S.], gold-beaters' skin, and some other valuable articles of a membranous character, are made from the intestines of animals—not (except in a few cases) from the whole thickness of the intestine, but from a very thin membrane which covers it either on the interior or the exterior. This class of employments is more largely carried on at Paris than elsewhere; and the boyaudiers mostly congregate in one spot.

It is from the large intestine of the ox that gold-beaters' skin is prepared. This intestine is composed of three coats or sheathings; the mucous membrane on the inside, the peritoneal membrane on the outside, and the muscular membrane between them. The peritoneal membrane is the one required for the purpose; and this used formerly to be loosened from the others by allowing the putrid fermentation to ensue; but this process occasioned such a fetid odour in the neighbourhood of the boyauderies at Paris, that a prize was offered to the discoverer of any new method whereby this separation could be effected in a less offensive manner. The result we shall speak of presently.

In the first place, the intestine is freed from all grease by soaking, scraping, and washing; it is then turned inside out, and put into a tub. The tub contains a strong alkaline liquor, in which the intestine is allowed to steep for several hours; and at the expiration of that time the mucous membrane has become so far loosened as to be easily removed. The alkaline liquor employed, called 'eau-de-Javelle,' removes all trace of fetid odour. The peritoneal membrane is afterwards carefully removed, and stretched out to dry. It is next steeped in a weak solution of potash, and carefully scraped. After this it is stretched out on a frame, with that surface undermost which had adhered to the muscular membrane; another membrane, placed the contrary way uppermost, is laid upon it, and the two are easily made to unite firmly together. membrane is then moistened successively with different of which one is a solution of alum, one a solution of [illegible] and another a layer of white of egg. Beating, drying, pressing are also among the processes to which the membrane is subjected; each manufacturer appearing to have his peculiar mode of proceeding.

A packet of skins properly prepared for gold-beating rather a costly piece of apparatus; but it will bear a mount of beating without injury. The skins may be or several months without becoming thinner or weaker. acquire however by degrees a greasiness of surface which them for their office; and this greasiness is removed by aving them with pieces of clean white paper, and ham- g them for a considerable time, whereby the greasiness oved from the skin to the paper.

allusion has been made to the mode in which the mem- (called 'baudruche') used to be made in France The has been deemed in that country so serious as to e the attention both of medical men and of the legisla- M. Parent Duchâtelet ('Dictionnaire de l'Industrie facturière,' art. 'Boyauderies') states that the odour g from the putrefactive fermentation of the substance e this is made, is more loathsome than any other inci- o manufactures; and that the effect of the exhalation on ealth of the inhabitants who lived near the boyauderies ach as to lead the French government, towards the end last century, to prevent the boyaudiers from continuing ry on the manufacture in the faubourg where they had egated, and where a street was named after them, the e la Boyauderie. They left that spot, and established elves near Montfaucon; but here they formed a new for disease and infection. At length, in or about 1820, ouncil of Health offered a prize, to be given through edium of the prefect of police, for the discovery of any either mechanical or chemical, for separating the peri- membrane without subjecting the intestine to the putre- action. M. Labarreque obtained the prize, by show- w chlorine could be employed both to fumigate the ops, and to loosen the membranes one from another t allowing the offensive odour to escape.

h regard to the exact truth of the statement, that this and the processes which produced it, were highly rious to health, persons are of different opinions. M. nt, a physician, and Parent Duchâtelet himself, assert ere is nothing seriously deleterious in them. Be this as , all agree that the stench was horrible, and that great ction was felt when the new mode was discovered, under pe that it would be adopted. Yet the boyaudiers are o oppose the utmost obstacles to the reception of the lan, and (as in the case of the needle-pointers of Red- and the fork-grinders at Sheffield) to adhere to their stem in spite of all suggested improvements.

1810 the different manufactories of France were ranged sses according to the unhealthiness of the employments; e boyauderies were placed at the head of the list of lissements Insalubres:' they were subjected to rather regulations in relation to the position and general ar- ments of the buildings; and these rules are still acted cases where the new method is not adopted.

LD-BEATING. This is a process whereby gold is ht to the state of very fine leaves, for use in various of gilding. The remarkable ductility of gold—a quality ssed by it to a greater degree than by any other known ance—is here taken advantage of to the fullest extent, as ns of limiting the quantity of this costly material required ding. So far is the attenuation carried, that a hundred e inches of nearly pure gold can be purchased for about nce.

is by a combined process of rolling and hammering that ttenuation of the gold is produced. The metal is melted mall crucible by the heat of a wind furnace; and is cast n iron ingot-mould, so as to form an oblong flat bar three-quarters of an inch in width, and weighing two s: a little borax is used to facilitate the melting of the and the ingot-mould is greased on the inside to prevent hesion of the gold to it. The ingot, when removed he mould, is immersed in hot ashes, whereby the gold annealed and freed from grease. When cold, it is to undergo the process of reduction in thickness, and tionate extension in length and breadth. Formerly, in e, the ingot was beaten out to the state of a thin riband, use of a forging-hammer about three pounds weight; e French gold-beaters now carry this hammering only h an extent as to reduce the ingot to the state of a plate one-sixth of an inch in thickness, and then finish by the the 'rolling,' 'flatting,' or 'laminating' mill. In Eng- his forging is dispensed with, and the reduction of the to the state of a riband is effected by means of the mill. mill consists of two rollers made of polished steel, per- cylindrical in form, and adjusted with very great nicety; st so act as to reduce the gold equally in every part, or else the further thinning could not be properly carried on. The milling is carried on until the ingot of two ounces is spread out to a surface of 960 square inches, with a thickness of rather more than 1-800th of an inch.

This thin riband of gold is then consigned to the hands of the gold-beater. The hammering does not take place on the gold itself; but thin membranes are interposed between the hammer and the gold. These membranes are of three kinds: an outside covering of common parchment; a set of leaves made of very fine and smooth calf-skin vellum; and another set made of the gold-beaters' skin described in the last article. The riband of gold is cut up into small pieces, each measuring exactly an inch square; and a hundred and fifty of these are interleaved with an equal number of leaves of vellum, about four inches square; each piece of gold being placed on the middle of a leaf of vellum. Over this packet of vellum-leaves is drawn a parchment case, open at both ends; and over this another parchment case in the opposite direction; so that the vellum and gold are enclosed tightly on all sides. The entire packet thus prepared is beaten. This beating is effected on a smooth block of marble, strongly imbedded beneath, and bounded on three sides by a raised ledge of oak wood; the front edge is open, and has a leathern flap attached to it, which serves as a kind of apron for catching fragments of gold that may fall off in the subsequent operations. The hammers employed are very ponderous, weighing about sixteen, twelve, and ten pounds respectively; the heaviest is used first, and the others are brought into use as the gold becomes thinner.

The packet of vellum and gold is laid on the stone, and the workman beats, with regular and heavy blows, on the middle of the upper side; there is a spring or elasticity of the packet which enables the hammer to rise easily after each blow; otherwise the work would be too laborious for any man continuously. The beater turns the packet over from time to time, to equalize the action among the leaves; and he occasionally bends the packet to and fro, to destroy any slight adhesion between the gold and the vellum: he also opens the packet at intervals, to see how the operation is proceeding. The beating is continued until each little inch-square piece of gold has become expanded nearly to the size of the vellum-leaves; and in order that the whole of the hundred and fifty pieces may be equally acted on, the packet is occasionally opened, and the inner pieces placed near the outside, to receive more action from the hammer.

When this degree of attenuation has been attained, the use of the vellum-leaves ceases, and that of the gold-beaters' skin commences. The packet is opened, and each piece of gold, being taken out and placed on a kind of cushion, is cut into four pieces with a knife.

The pieces of gold, now increased in number from a hundred and fifty to six hundred, are interleaved with an equal number of pieces of the prepared gold-beaters' skin. The packet thus prepared is enclosed in parchment, and beaten in the same way as before, but with a smaller hammer. The pieces of gold become by degrees expanded, until they attain nearly the size of the skin-leaves. The packet is again opened, the leaves of gold are again cut into four each, and the quarters are again interleaved with gold-beaters' skin. The cutting is, in this second instance, effected by the smooth edge of a strip of cane, since the thin gold would be liable to adhere to a steel knife. As the pieces of gold, now 2400 in number, would be too numerous to be beaten in one packet, they are divided into three parcels of 800 each, and each packet is interleaved with gold-beaters' skin, enveloped in parchment, and beaten, in the same way as before. A third time these leaves expand nearly to the size of the skin-leaves; and by this expansion the necessary degree of thinness is attained. By the three beatings and the two quarterings, the gold is expanded to an area about 190 times greater than it presented when in the form of a riband. The attenuation may be rendered more intelligible by stating that 100 square feet of the leaf-gold weigh no more than an ounce—a result nearly as surprising as anything presented in the mechanical arts. Gold can be beaten to a much greater degree of thinness than that ordinarily used; but the waste occasioned by broken leaves, and the additional nicety and labour required, more than counterbalance the advantages.

When the last beating is finished, the packet is opened, and the thin leaves of gold removed one by one. The gold-beater makes use of a delicate pair of long pincers, made of white wood, and takes up the fragile leaves of gold one by one. Each leaf is laid down on a cushion, and blown out flat by the breath of the workman: if any of them have been broken or injured in the beating, they are thrown aside, to be remelted for future use; but otherwise each leaf has the ragged edges cut from it, so as to bring it to the size of about three inches and a quarter square. Small books are prepared, each book containing twenty-six leaves of paper about four inches square; both surfaces of every leaf are rubbed with red chalk, to prevent the adhesion of the gold; and twenty-five leaves of gold are placed in each book. In this form the leaf-gold is sold.

The French adopt the same general mode of proceeding as the English gold-beaters, but vary it slightly in detail. The laminated riband is cut into pieces an inch and a half long by an inch wide, and about 1-24th of an inch thick. Twenty-four of these are laid one on another on a smooth slab of steel, and hammered until they are two inches square. Fifty-six of those expanded leaves are made up into a packet, with two leaves of vellum between each. This packet is enclosed in a sheath, and is beaten with a hammer in the same way as in England. Indeed the hammering and quartering, and the use first of vellum and then of gold-beaters' skin, are the same in most of their features as those already described; but the French gold requires more hammering on account of the greater weight and size of the pieces at the commencement of the beating.

Two other metals, silver and copper, have sufficient ductility to be brought into the state of thin leaves by hammering; and both are used to a limited extent in this state in the arts. But these metals would fracture long before such a degree of thinness could be obtained as in the case of gold; and indeed the smaller value of the material renders it less important to economise material in this way: consequently leaf silver and copper are thicker than leaf-gold.

GOLDING, ARTHUR, was born in London, of a good family, at some time in the early part of the sixteenth century. In 1564 he was living in the house of secretary Cecil, in the Strand; and his dedications show him to have been patronized also by the Earls of Leicester and Essex, Lord Cobham, Sir Christopher Hatton, and other men of station in his time. His earliest known work was printed in 1562. After the death of Sir Philip Sidney, which took place in 1584, he completed Sir Philip's translation of Philippe de Mornay's French treatise on the truth of Christianity; and he must have been alive till 1587, when that translation was published, or perhaps for two or three years longer. The dates of his published writings extend over the whole of the period thus marked out. They amount to about thirty; of which however, besides some copies of verses, one only is original, a religious 'Discourse upon the Earthquake' of 1580. The rest of them are translations, chiefly from the Latin, but some from the French. Several are theological or ecclesiastical works, of Calvin, Chytræus, Bishop Grosteste, and others: two or three are historical. But those which were most useful to his contemporaries were his translations from the Latin classics. These embraced, in succession, prose versions of Justin, Cæsar, Seneca, Pomponius Mela, and Solinus, and a spirited and not very unfaithful translation of Ovid's Metamorphoses into fourteen-syllable verse. Four books of the Ovid were published in 1565, and the complete work in 1575. Golding deserves to be commemorated, on account of the great influence which he and other translators of the classics exercised upon the dawning poetry of England.

GOMER-CHAMBER. [CHAMBER, P. C.]

GOMERA, one of the Canary islands, is situated between 28° 1′ 30″ and 28° 13′ N. lat., and between 17° 48′ and 18° 4′ W. long., more than twenty miles from the western shores of Teneriffe. In shape it resembles an isosceles triangle, of which the base is nearly twenty miles long, and the other two sides fifteen. Mac Gregor assigns it an area of 168 square miles, so that it is only a little larger than the smallest of the English counties, Rutlandshire (149 square miles). The surface is extremely mountainous and uneven. It presents a continual succession of narrow glens, or barrancos, and narrow ridges, which terminate on the shores with high and steep rocks. It is not known to what elevation the highest summits rise above the sea, but the circumstance that they sometimes preserve the snow which falls on them for several days would lead us to suppose that they must exceed 6000 feet. The elevation of its mountains must be the cause that the island is abundantly watered, and the sides of the mountains mostly covered with wood. The soil is stated to be of excellent quality, but only one-ninth is under cultivation, and even this small proportion is badly worked, which is attributed to the entire want of enclosures. The climate is [illegible] as that of the other Canaries, but in all these places which are built in the narrow barrancos it is unhealthy for want of ventilation. The productions are the same as those of Teneriffe (P. C. vol. xxiv. p. 204), to which island it exports wine, brandy, orchilla, silk, and dry fruits. The population amounts to about 9000 individuals, or 54 to a square mile. The principal place is San Sebastian, inhabited by about [illegible] individuals. In this town Christopher Columbus was [illegible] for some time before he sailed to America, and it is here he is said to have received some information of the [illegible] of the New World, from an Andalusian captain, [illegible] Sanchez de Guelva, who had been cast-away by a [illegible] and returned to Gomera. The port of San Sebastian, [illegible] Puerto de la Gomera, is said to be the best in the Canary Islands for large vessels. This island was conquered by Jean de Bethencourt in 1406, is at present the private property of the Marquis of Belgida and San Juan, and has the title of a county.

(*Die Canarischen Inseln nach ihren gegenwärtigen Zustande*, von Mac Gregor.)

GONDAR, the capital of Abyssinia, is in 12° 36′ N. lat. and 37° 32′ E. long, not far from the northern border of a plain which reaches from the northern shores of Lake Tzana to the table-land of Wogghera, and extends about [illegible] miles in that direction. From the base of the table-land several low ridges run southward into the plain, and on the extremity of one of them the town is built, between two small rivers, the Angerab on the east, and the Gaha on the west. The town covers a considerable space of ground, which formerly, as it appears, was entirely filled up with buildings and gardens, but the larger portion at present consists of ruins or tracts overgrown with canes. The inhabited parts do not consist of one continuous mass of buildings, but of some isolated groups of buildings, lying at some distance from one another. The largest of these groups lies on the [illegible] side, and is only inhabited by Mohammedans: hence it is called Islambad; and not far from it is Etsheghebad. These two quarters contain half the population of the town. One of them, called Felashabad, is inhabited only by Jews.

Over this space and mostly among the ruins a great number of churches are dispersed. It is stated that there are [illegible]. The buildings are in form and arrangement very different from our churches. They have the form of a cylinder surrounded by a corridor. In the midst of the building is a space in the form of a cube, surrounded by a wall. The centre of this space is occupied by a kind of throne [illegible] which is to represent the tabernacle. A conical roof of [illegible] covers the whole building. Many large doors lead from the corridor to the body of the church, and three smaller ones from the body of the church to the cubical enclosure. There are numerous paintings on the doors, walls, and [illegible]; they have no great claim to artistic excellence. The churches are surrounded by avenues of large trees.

The houses have the shape of a cylinder, and a [illegible] of straw. A gate leads from the street into a spacious court-yard, and hence a large door into a small room, at the end of which there is a large saloon; at its other extremity is an alcove, which occupies the back portion of the building. The saloon has five doors. One opens, as already observed, into the large court-yard between the house and the street. Two doors, placed at the right and left of the principal entrance, lead to the two oblong rooms which enclose the saloon on either side, and from which two other doors lead to the smaller court-yards. Two other doors of smaller dimensions are near the alcove. One of them leads to a small dark room, in which all things of value are deposited; and by the other the master of the house, who always sleeps in the alcove, can get without being observed into the adjacent room, and into one of the smaller court-yards. When the house has two stories, the upper one is arranged in this manner and inhabited, the lower being only used as stables. One of the lateral rooms serves as a kitchen. The smaller court-yards are separated from one another by walls, and they communicate with the larger court-yard only by the saloon. The houses are built of volcanic stones in their natural shape, and they are cemented by a loamy earth.

To the north of the town stands the palace of the emperor, or Negus, which was built by Fasilidar in the seventeenth century. It is surrounded by a high wall surmounted by [illegible], and contains a large court-yard and several large buildings, now in ruins, except one of moderate size, in which the present emperor resides.

number of houses, according to Rüppel's estimate,
t exceed 1000, and the population does not exceed
The continual internal wars, which in the last sixty
ave laid waste the whole surrounding country, have
diminished the population. With the exception of
erous clergy, all the inhabitants are engaged in com-

As almost every month the regular communication
n the different parts of the country is interrupted by
asion of an enemy or the turmoils of its inhabitants,
s of goods are subject to sudden and great changes in
nd this has induced every person to enter into specula-
Besides, Gondar is situated on the only well-fre-
l road which leads from the harbour of Massowa to the
of Africa, and all goods brought from Europe, Asia,
pt to be consumed in those parts pass through the
f merchants established in Gondar. Very few articles
le in this town: those of iron are the most important,
are limited to knives, ploughshares, and lance-heads:
is imported from the province of Gojam, which lies
Lake Tzana. Several families are engaged in tanning,
se who make shields of leather furnish an article distin-
by beauty and of good quality. Earthenware is made
quantities; but this branch of industry is confined to
s. The workmen in silver are not distinguished by
taste. The copying of books is still carried on to a
tent, and is generally done with neatness and even
and the binding of the books shows much taste.

ce's *Travels to discover the Sources of the Nile;*
, *Reise in Abyssinien.*)

IO'GNATHUS, a genus of fossil Cycloid fishes,
e London clay. (Agassiz.)

IO'PHORUS (Agassiz), a genus of fossil Echinida,
e green sand. (Morris's *Catalogue.*)

DS AND CHATTELS. [CHATTELS, P. C.]

DYERA, a genus of plants belonging to the natural
rchidaceæ, and the tribe Limodoreæ. It has a ringent
; the lips entire, included, saccate at the base; the
ostellated, subcordate; the rostellum erect, bipartite,
rge squarish appendage between its slender segments.
cies of this genus, *G. repens*, is found in Scotland. It
m 6 to 8 inches high, with the radical leaves ovate,
reticulated, and the whole upper part of the plant
with minute stalked glands. It is found principally
ests.

gton, *Manual.*)

SEBERRY. [RIBES, P. C.]

CUM, or GORINCHEM, is a small town in the
of South Holland, in 51° 50′ N. lat., and 4° 58′ E.
t is situated on the right bank of the Merve, at its
e with the Linge, which flows through the town.
is a fortified town, and offered some resistance in the
of Holland by the Prussians in 1787. The French,
retreat in the spring of 1814, left a garrison in it, which
asion to some fighting. The population is now about
habitants: they have no manufactures worth speak-
except tobacco-pipe heads. The trade is chiefly in
in salmon, of which they have considerable fisheries.
se is still shown in which Grotius took refuge after
e from the Castle of Loevestein, in which he was
d.

Lexicon; Hassel, *Handbuch;* Cannabich, *Lehr-*
in, *Geogr. Lehrbuch*, by Hörschelmann.)

ON, ROBERT, was born in Aberdeenshire about
580. He studied first at Aberdeen, and afterwards
On his father's death in 1600 he returned to Scot-
succeeded to his ancestral estate of Straloch. At
the vast collection of maps, and corresponding letter-
graphical and historical descriptions, projected by
Amsterdam, was in progress. The Dutch editors
put in possession of some geographical drafts of
s provinces of Scotland, drawn by Timothy Pont, an
geographer. These drafts, which are now preserved
dvocates' Library, are singularly minute and curious,
valuable as throwing light on the state of the country
ondition of property in Scotland at the time when
e executed. Pont had died in the execution of his
ing these drafts, minute and apparently accurate, but
ary and totally destitute of arrangement. The
f the Atlas applied to King Charles, and solicited his
e of the portion of the work applicable to Scotland,
appointment of a person qualified to complete the
It was placed by royal authority in Gordon's hands,
The part of Blaeu's Atlas commonly called 'Theatrum Scotiae,' was finished by Gordon in 1648, and forms one of the eleven volumes of that work. It contains forty-nine minute and highly finished maps of the various provinces of Scotland, accompanied by a description in Latin, full of the results of extensive and accurate research. The result of the knowledge and labour bestowed on this work was to give a greater prominence to Scotland in this general geographical work than the position of the country entitled it to. Gordon's labours were considered as of so much national importance, that by a special act of parliament he was exempt from the quartering of soldiers and other public burdens, and as he abstained from connecting himself with either side, he was respected in the midst of his labours by both the parties by which the country was then distracted. Gordon died in 1661. The geographical papers which he had originally prepared were still more extensive than the work published by Blaeu. There is a large mass of them among the MSS. in the Advocates' Library, in the printed catalogues of which their titles will be found, and some portions of them have been lately printed by the book-clubs. Gordon had collected materials for a history of his own adventurous time. His son, James Gordon, clergyman of Rothiemay, who seems to have assisted him in his geographical labours, put these materials in a narrative form, and the 'History of Scots Affairs,' thus prepared, was printed in 1841, in three volumes, 4to. for the Spalding Club.

(Chambers, *Biographical Dictionary of Eminent Scotsmen; Introduction to History of Scots Affairs from* 1637 *to* 1641, by James Gordon, Parson of Rothiemay; Works referred to.)

GORSE. [ULEX, P. C.]

GOSSON, STEPHEN, a native of Kent, was born in 1554. In 1572 he was entered at Christchurch, Oxford, where he took his bachelor's degree, and then removed to London. He was there a family tutor, and wrote three plays—a tragedy called 'Catiline's Conspiracies,' a comedy called 'Captain Mario,' and 'Praise at Parting,' a moral play. These plays were never printed, and would now be quite unknown but for the remorseful mention which the author himself afterwards made of them. He was but twenty-five years old when he published one of the most curious, and the second in order of time, of the Puritanical tracts inveighing against plays and stage-playing. This was 'The Schoole of Abuse, conteining a plesaunt invective against Poets, Pipers, Plaiers, Iesters, and such like Caterpillers of a Commonwealth,' 1579, 1587. This pamphlet, more scurrilous than either pleasant or logical, was reprinted by the Shakespeare Society, in 1841. It was followed in the same year by Gosson's miscellaneous volume, called 'The Ephemerides of Phialo' (reprinted in 1586), one part of which, 'A Short Apologie of the Schoole of Abuse against Poets, Pipers, Players, and their Excusers,' was directed against Thomas Lodge's 'Reply to Stephen Gosson touching Plays.' Both of these works of Gosson were dedicated to Sir Philip Sidney, who, according to Spenser, scorned the writer for his labour. He took up the argument again, with violent personal abuse of Lodge, in his 'Plays confuted in Five Actions,' published in 1581 or 1582, and dedicated to Sir Francis Walsingham. Another work of Gosson is the 'Pleasant Quippes for Upstart Newfangled Gentlewomen,' printed in 1595, and again in 1596; a versified composition containing some hard satirical hits, but no poetry. His only other known effusions are verses prefixed to three works of his day, and a sermon called 'The Trumpet of War,' which was printed in 1598. Gosson had then taken orders, and was parson of Great Wigborough in Essex. In 1600 he was instituted to the rectory of St. Botolph, Bishopsgate; and it is a curious fact that there exists a letter of his dated in 1616, in which, with expressions of respect, he recommends, to Edward Alleyn the player, three poor people for admission to Dulwich Hospital. Gosson held the rectory of Saint Botolph at his death, which took place in his parish on the 13th of February, 1623, when he was sixty-nine years old.

GOUJON, JEAN, a celebrated French sculptor of the sixteenth century, called sometimes the Correggio of sculptors, from the softness and delicate roundness of his execution, especially in basso-rilievo, in which he was excellent; he is also sometimes termed the father of French sculpture. Many of his works have perished, but two of the best still remain: the bassi-rilievi of the Naiades of the Fontaine des Innocents, and the four colossal Caryatides in the Louvre, in the 'Salle des Cariatides,' so named from Goujon's works, built in the reign of Henri II. Goujon was also an architect; he was architect to the king, and was appointed, conjointly with

Pierre Lescot, to superintend the building of the Louvre. He was employed also in other works by Henri II.; and he made for him a large naked statue of his mistress, Diana of Poictiers (the Duchess of Valentinois), which is now in the Louvre, in the Salle d'Angoulême. The figure, which is reclining and resting against a stag, has been extravagantly praised; but it is neither well proportioned, nor does it possess any fine development of form characteristic of the female: it is long, and wants undulation of line; but this peculiarity might be supposed to belong to the individual, were not the nymphs of the Fontaine des Innocents conspicuous for the same defects, which shows that they are defects of manner. The accessary parts of his works are elaborately executed. Goujon was a Huguenot, and fell a victim to the massacre of St. Bartholomew, in 1572; he was shot while on a scaffolding, working upon some bassi-rilievi at the Louvre. His remaining works have been recently engraved and published in large octavo, by A. Reveil, 'Œuvres de Jean Goujon, gravé au trait d'après ses Statues,' &c., Paris 1829. (D'Argenville, *Vies des fameux Architectes et Sculpteurs*, &c.; Dandrè Bardon; Watelet; Reveil et Duchesne; &c.)

GOYEN, JAN VAN, a celebrated Dutch painter, born at Leyden in 1596. He studied under several masters, and lastly under E. Vandervelde; and is distinguished for busy canal and river scenes, and occasionally sea pieces; some of his figures were painted by Jan Steen. His pictures are good in all respects saving colour, in which they are cold, green, and dark—owing no doubt chiefly to the effect of time upon an injudicious choice of colours, or, as some conclude, to the use of Haarlem blue. Van Goyen was certain and rapid in his execution, and once wagered, as related by Hoogstraeten (Academie der Schilderkunst), with two other painters, N. Knipbergen and J. Parcelles, to paint the best picture in a single day: the works of all three were good, but the judges awarded the prize to Parcelles. He died at the Hague, according to Houbraken, in 1656. There are a few etchings by him.

(Houbraken, *Groote Schouburg*, &c.)

GO'ZZOLI, BENOZZO, a celebrated old Italian painter, born at Florence in 1400, according to Vasari, who calls him simply Benozzo in his first edition, but 1406, according to Ciampi. He was the pupil of Fra Giovanni da Fiesole, whose works, as well as those of Masaccio, he studiously imitated, but he failed completely in attaining Masaccio's style of design. Many of Benozzo's frescoes still exist in a tolerable state of preservation, more or less. Those in the Campo Santo at Pisa are considered the best. He painted here twenty-four pictures, covering one whole side of the building; he commenced in 1469, and finished them in 1485, and was paid for each picture about ten ducats (66 lire); he was to paint by agreement three pictures in a year. Supposing Benozzo's whole time was thus occupied, which it probably would have been if he had painted three pictures every year, we have a great painter fully employed in the middle of the fifteenth century, for a salary of less than thirty ducats, or about 13*l.* sterling per annum. This sum was worth in England at the same time, about twenty oxen [Austen, William, P. C. S.]; and if we compare with it the value of twenty oxen in the present day, we shall arrive perhaps at a fair estimate of the value of an eminent painter's time at that period: which will be upwards of 300*l.*: a sufficient income, if for the spring and summer months only. Benozzo was, however, paid at a higher rate at Orvieto, in 1447, when he received seven ducats per month: but this must have been merely during the spring and summer months, when fresco painters can only work.

Benozzo painted also in Florence, at Rome, at Volterra, and at San Gimignano, but he settled and died at Pisa, in what year is not exactly known. Vasari was misled by the inscription on his tomb in the Campo Santo, which is not the date of Benozzo's death, but the date of the year in which Pisa presented him with the tomb during the progress of the paintings. The inscription was evidently placed during Benozzo's life-time; it is as follows:—'Hic tumulus est Benotii Florentini qui proxime has pinxit historias. Hunc sibi Pisanorum donavit humanitas MCCCCLXXVIII.' He probably died in 1485.

(Vasari, *Vite de' Pittori*, &c., and the notes of Schorn's German Translation; Ciampi, *Notizie inedite della Sagrestia Pistojese;* Rosini, *Descrizione delle Pitture del Campo Santo di Pisa;* Rumohr, *Italienische Forschungen.*)

GRACILLARIA. [Sea-Weeds, P. C.]

GRADIENTS. [Railway, P. C., p. 250.]

GRAHAM, JOHN, Viscount Dundee, commonly c Claverhouse, from the name of an estate belonging to father Sir William Graham, of whom he was the second. He was probably born about the year 1649 or 1650. is said to have studied at St. Andrews, and to have some proficiency in the mathematics; but learning was a sphere in which he shone; and Sir Walter Scott, who endeavoured to raise his character from that of the ordinary soldier of fortune, and to endow him with a higher feeling, cannot help comparing his letters to those of a chamber-maid. Many of the younger sons of the Scottish gentry—poor, intrepid, and accustomed to that superiority over their neighbours which suits a man at once for command in a half-disciplined army—had by these qualities held commissions during the Thirty Years' war, without being very fastidious about the side on which they fought. Graham was evidently brought up to this trade. He entered first the French and then the Dutch service, obtaining in the latter considerable distinction. Being however refused the command of a regiment, he returned to Scotland in 1677. He obtained a captain's commission in one of the troops of horse employed in enforcing obedience to the penal laws against nonconformists in Scotland. Among many cruel instruments, he became conspicuous by his barbarity, and obtained an unenviable renown in history, romance, and local tradition. A considerable body of Covenanters having announced that they were to hold a solemn preaching on 1st June, 1679, Graham, on his way to disperse them, was met by an advanced body of these enthusiasts, armed and well commanded, who, in a piece of ground called Drumclog, dispersed his troopers, and compelled him to fly for his life. At the subsequent battle of Bothwell Bridge his exterminating counsels were fortunately counteracted by the milder genius of Monmouth, the commander of the expedition. In 1688 he was raised to the peerage by the title Viscount Dundee and Lord Graham of Claverhouse. While the Convention Parliament was sitting in Scotland arranging the Revolution settlement, he put himself at the head of some Highland and Irish marauders, with whom, on the 17th of June, 1689, he successfully defended the pass of Killicrankie against Mackay until he was killed by a random shot.

(Douglas's *Peerage of Scotland;* Laing, *History of Scotland;* and other historical works.)

GRAHAM, ROBERT, the third son of Dr. Robert Graham, afterwards Moir of Leckie, was born at Stirling on the 3rd of December, 1786. He followed his father's profession, and in the early part of his life practised medicine in Glasgow. Previous to the year 1818 there was no separate chair of botany in the University of Glasgow, and lectures on this subject were read by the professor of anatomy in the summer season. On the government establishing a separate chair for botany, Dr. Graham was appointed to the post. In 1821 the chair of botany becoming vacant in the University of Edinburgh, Dr. Graham was the successful candidate for the office. He was also appointed physician to the Infirmary and conservator of the botanic garden of Edinburgh. To the latter office he speedily devoted much attention, and to his exertions the garden is mainly indebted for its present flourishing condition.

Although Dr. Graham evidently possessed but little botanical knowledge, on his being appointed to the Glasgow chair he devoted himself with great enthusiasm to the study of it in Edinburgh, and he probably enlisted the feelings of his pupils more by his enthusiasm than his deep knowledge. One plan which he adopted was very successful in producing a love of the science he taught, and that was his practice of making excursions with his pupils to some distant part of the country. He thus examined, during successive summers, the floras of several important districts of Scotland, England, Wales, and Ireland. The knowledge which he thus obtained induced him to prepare materials for a Flora of Great Britain which however he did not live to publish. His published works consist chiefly of descriptions of new or rare plants which flowered in the botanic gardens of Edinburgh. These, as notices of his excursions and other papers, appeared in the 'Edinburgh New Philosophical Magazine,' Curtis's 'Botanical Magazine,' and Hooker's 'Companion to the Botanical Magazine.'

Although Dr. Graham was a strong and powerful man, his health gave way some years before his death, and he eventually died on the 7th of August, 1845, of an encephaloid tumour which occupied the back part of the thorax and pressed he great vessels of the heart. He was a frank kind- l man, and few men have left behind them a larger of affectionate friends to lament his death.

ndon and Edinburgh Journal of Medical Science.)

AHAM, SIR THOMAS. [Lynedoch, Lord, S.]

AHAM, MARIA. [Calcott, Sir Augustus, S.]

ANA'TEÆ, a natural order of plants separated by Don from Myrtaceæ [Myrtaceæ, P. C.], and con- ig only the species of the genus Punica [Punica, . It differs from Myrtaceæ in the leaves being desti- glands, and in being without the intramarginal vein, in the nature of its fruit, its pulpy seeds, and convolute ons. (G. Don, *Gardener's Dictionary*.)

NGER, REV. JAMES. So little is known of the history of Granger, that even the date of his birth to be unrecorded. He studied at Christ Church, and was presented to the vicarage of Shiplake, in hire, where, according to the dedication of the work rought him into notice, he had 'the good fortune to rly to independence, obscurity, and content.' This hich must have occupied many years of preparatory s entitled 'A Biographical History of England, from he Great to the Revolution; consisting of characters in different classes, and adapted to a methodical Ca- f engraved British Heads; intended as an Essay to- ducing our Biography to system, and a help to the ge of Portraits.' The first edition appeared in 1769, to. volumes, each forming two parts, so that it is cribed as in four volumes. Some copies of this edi- e printed upon one side of the paper only, to leave manuscript notes, or for the insertion of illustrations. appeared, in the same size, a 'Supplement' of cor- and additions, in one volume, which was incorporated econd edition of the whole work, in four volumes, 1775. The third, published in 1779, is evidently same types as the second. According to Nichols's y Anecdotes,' vol. v. p. 267, there was another however is erroneously called the *third*) edition in hich we have not seen, but which is mentioned in the man's Magazine' for October, 1803, as in prepara- d a fifth edition, with upwards of four hundred addi- es, appeared in 1824, in six thin royal 8vo. volumes. made considerable progress in the preparation of a ion of the work, and there are extensive manuscript s in the British Museum, which were formed by his r William Musgrave to assist him in this object, but ot live to complete it; and the continuation, which nly to the end of the reign of George I., and was by the Rev. Mark Noble, partly from his own and m Granger's collections, did not appear until 1816. three volumes, 8vo. Granger's work certainly con- h curious matter, and has been useful in promoting r British biography; but, as it was designed rather stration of British portraits, than as an account of orthies, we find him, as Chalmers observes, 'pre- he memory of many of the most worthless and insig- f mankind, as well as giving a value to specimens of f engraving which are beneath all contempt.' So impulse was given to the taste for collecting portraits ublication of this work, that in many cases it was with an ardour truly ridiculous, books being unscru- mutilated to supply the demand, and the most pre- s prices being given for engravings of little intrinsic genuine historical interest. Granger, who published else except a few single sermons and tracts, died on of April, 1776, at the age, it is supposed, of about An 8vo. volume, containing extracts of his corre- ce with several literary contemporaries relative to his d miscellanies and notes of tours in France, Holland, ain, edited by J. P. Malcolm, appeared in 1805. s's 'Biographical Dictionary,' and sundry notices in s 'Literary Anecdotes' and the 'Gentleman's Maga- m the principal authorities for his life.

NT, ANNE, commonly called Mrs. Grant of Lag- miscellaneous writer, was born at Glasgow on 21st y, 1755. Her maiden name was Macvicar, and her Duncan Macvicar held a commission in the army and for some time in America before the Revolution. He possessed of considerable estates in the township rendon, now in the state of Vermont, which on the ng out of the war were appropriated by the revolutionists, while he did not come within the scheme of compensation to sufferers, as he resided in Britain during the war. In 1773 he became barrack-master of Fort Augustus in Inverness-shire, and there his daughter met Mr. Grant, the clergyman of the neighbouring parish of Laggan, to whom she was married in 1779. In 1801 she was left a widow with a large family, and in very straitened circumstances. She had for some time shown a taste and talent for poetry, and in 1803 her friends prevailed on her to publish a volume of 'Original Poems with some Translations from the Gaelic,' which was very successful. Since the time of her first residence in the Highlands she had studied the position and habits of the people, and written a series of letters on the subject to her intimate friends, from 1773 downwards. She had thus fortunately prepared for herself a resource against poverty. She was prevailed on to collect these letters, and offer them for publication to Messrs. Longman and Co. They agreed to publish the series, taking the risk and giving her half the profits. Thus were published in 1806 'Letters from the Mountains,' one of the most successful of the productions of light literature in its day. She says, 'My booksellers dealt liberally with me, and many persons of distinguished worth interested themselves in me, and sought my acquaintance in consequence of perusing these letters.' She subsequently lived at Edinburgh, where she was the highly esteemed centre of a circle of accomplished and amiable people. Through a long train of domestic calamities, accompanied by bodily infirmities, she preserved an equal serenity of temper, her company was sought by the best Scottish society, and she was even enabled, while carrying on a long war with pecuniary difficulties, to be generous to others. In a letter written in 1830 she thus characteristically describes part of her day's occupations: 'Afterwards come dependants. Could you dream of my having dependants, who have all my life been standing on the edge of the gulf of poverty without falling in; and this, not because I had much worldly prudence, but because I made a stern self-denial, and what Miss Edgeworth calls civil courage, serve me instead? Well, but my dependants want a letter to some one, or advice, or a governess's place, &c., and my protégées have turned out so well, that I have constant applications for such persons.' She published 'Memoirs of an American Lady,' in 1808; and 'Essays on the Superstitions of the Highlands of Scotland,' in 1811. She died on 7th November, 1838.

(*Memoir and Correspondence of Mrs. Grant of Laggan*, 3 vols.)

GRAPHIS. [Liverworts, P. C. S.]

GRAPHITE. [Plumbago, P. C.]

GRAPTO'LEPIS, a genus of fossil Ganoid fishes, from the carboniferous system of Carluke. (Agassiz.)

GRAVELOT, HUBERT FRANÇOIS D'ANVILLE, designer and engraver, was born at Paris in 1699. He was the brother of D'Anville, the eminent geographer. When about thirty years of age, Gravelot commenced the study of painting under Restout, but he eventually adopted designing, and established himself in London as a designer and etcher about the year 1732, and found considerable employment: he returned however to Paris in 1745, and obtained considerable reputation there, chiefly as a designer. His principal works are—the drawings for the monuments of kings for Vertue; many of the etchings to Sir Thomas Hanmer's edition of Shakspere, after his own and Hayman's designs; also those for Theobald's 'Shakspere' from his own designs; a large print of Kirkstall Abbey, and many ornamental designs, executed in England. In Paris he designed the illustrations for Luneau de Boisjermain's Racine; for the great edition of the works of Voltaire by Pancoucke, and for editions, of the 'Contes Moraux' of Marmontel, and of the works of Boccaccio, and of Ariosto. He died in 1773.

(De Fontenai, *Dictionnaire des Artistes*; Vertue, *Catalogue of Engravers*.)

GREEN, VALENTINE, a celebrated English mezzotint engraver, was born in Warwickshire in 1739. After serving a short time with a line engraver at Worcester, he came to London in 1765, and turned his attention to scraping in mezzotint. He acquired a great reputation by his many prints after West, especially two large plates published a few years after his arrival in London, of the Return of Regulus to Carthage, and Hannibal swearing eternal enmity to the Romans, two of West's most celebrated pictures now at Hampton Court, and originally painted for George III. The Stoning of St. Stephen after West is one of Green's masterpieces. He engraved also many of the pictures of the Düsseldorf Gallery, for which he was granted an exclusive privilege by the Elector of Bavaria in 1789, who afterwards conferred on him the title of Hof Kupferstícher (court engraver). He executed also several great plates after Rubens, including the Descent from the Cross at Antwerp, and other masterpieces. He engraved in all upwards of three hundred plates. He was elected an associate engraver of the Royal Academy in 1774: he died in 1813, aged 74.

(Bryan, *Biographical Dictionary of Painters and Engravers.*)

GREENE, ROBERT, was a native of Ipswich. The date of his birth was probably a few years later than 1550. He was educated at St. John's College, Cambridge, where, in 1578, he took his bachelor's degree, and his master's in 1583; and he was incorporated at Oxford in 1588. Between 1578 and 1583 he travelled on the Continent, visiting Italy and Spain; and it has been asserted, on the evidence of concurring probabilities, that at some time or other in the early part of his life he took holy orders. But his academical degrees are almost the only facts in his history that can be ascertained with exactness. From about 1584 he was a frequent writer for the press and for the stage; and from some of his pamphlets, which make a half-poetical kind of confessions not unlike those of Byron, a few particulars of his melancholy career may be doubtfully gathered. It thus appears that he married the daughter of a gentleman in Lincolnshire; but that, after she had borne a child to him, he abandoned her for a mistress; and his subsequent life seems to have been spent in alternate fits of reckless debauchery and of the distresses and remorse which his excesses caused. In August, 1592, a surfeit at a tavern in London threw him into an illness, which proved fatal. He was then in a state of abject poverty: and in a letter which he wrote to his wife the day before his death, charging her to pay a debt of ten pounds owing by him to his host, a poor shoemaker near Dowgate, he declared that, if this man and his wife had not succoured him, he must have died in the street. His death-bed was attended by the shoemaker's wife, and by another woman who was the sister of a hanged malefactor, and by whom he had had a natural son. He expired on the 3rd of September, 1592. Next day he was buried in the new churchyard near Bedlam.

The name of this unhappy man is very important in the early history of the English drama. Marlowe was the most distinguished of those poets who took the great steps which heralded the rise of Shakspere. Greene and Peele held the second rank among those precursors of the golden age of our dramatic poetry. Greene no where exhibits either the glowing passion or the overflowing imagination of Marlowe; and his works are not only unequal, but in all respects irregular and anomalous. Yet they show much sweetness of fancy, many touches of nature in incident as well as in character, and a poetic spirit which, if not lofty, is far above the range of the prosaic or ordinary. He was a man of decided genius; and his plays are valuable monuments of this interesting period in dramatic history. None of them were printed till after his death. Five have come down to us that are certainly his: 'The History of Orlando Furioso,' 1594, 1599, an eccentric but imaginative and not uninteresting performance; 'A Looking-Glass for London and England,' 1594, 1598, 1602, 1617, written by Greene and Thomas Lodge jointly, a dramatic version of the prophecy of Jonah against Nineveh, and, amidst its whimsicalities, the most dramatic of Greene's works; 'The Honourable History of Friar Bacon and Friar Bungay,' 1594, 1599, 1630, 1655, a legendary play, natural and poetical, and on the whole the most pleasing of the series; 'The Comical History of Alphonsus, King of Arragon,' 1599, a group of heroic pictures, in which the poet emulates, with tolerable success, the swelling vein of Marlowe; 'The Scottish History of James the Fourth,' 1598, a most extravagant yet not unpoetical invention, having nothing of history in it but the names. There has been attributed to Greene, upon very doubtful evidence, the lively drama of 'George a-Greene, the Pinner of Wakefield,' printed in 1599. It has likewise been asserted that he wrote, or had a share in writing, one or both of the plays which are the groundwork of 'Henry VI.,' Parts ii. and iii. The opposite and sounder opinion is maintained, and the state of the controversy set forth, in Mr. Knight's editions of Shakspere ('Essay on Henry VI. and Richard III.')

'George a-Greene' is in all the editions of Dodsley's Old Plays: 'Friar Bacon' is in Mr. Collier's edition of that collection. Two excellent editions of Greene's dramatic works, with all his other compositions in verse, have been published by Mr. Dyce, 2 vols. 12mo., first printed in [illegible] In those volumes Mr. Dyce has given a full account of Greene's Life, with copious specimens of his prose works, and a list of them which is complete, or almost so. The list contains thirty-four pieces, which are undoubtedly his. Their matter is very various. In his gayer hours he wrote love-stories and other novels; sketches of society, chiefly in its disreputable walks; and miscellaneous essays: in his moments of remorse he wrote warnings to debauched youth, and ample but exaggerated and romantic confessions of his own follies. [illegible] of this last class are the following:—'Greene's Never Too Late: or, a Powder of Experience sent to all Youthful Gentlemen to root out Infectious Follies,' 1590; 'Greene's Mourning Garment, given him by Repentance at the Funeral of Love,' 1590; and 'Greene's Groatsworth of Wit, bought with a Million of Repentance,' 1592, which was published soon after his death by his friend and fellow-labourer Henry Chettle, and has been reprinted by Sir Egerton Brydges, 1813. One of his novels, 'Pandosto, the Triumph of Time,' otherwise called 'The Hystorie of Dorastus and Fawnia,' is the original of 'The Winter's Tale.' It was first printed in 1588, had reached a twelfth edition in 1735, and is reprinted by Mr. Collier in his 'Shakespeare's Library,' [illegible] Some other tracts of Greene will be found in the 'Archaica' and 'Harleian Miscellany.' All the prose works are interspersed with pieces in verse, which are by far the best part of them. The style is their weak point: it is deformed by a close copying of Lilly's worst affectations; and although, when we examine the matter, we often discover picturesque descriptions, and sometimes touching passages of narrative, yet nowhere in the tedious and perplexed mass do we find any reason for saying more of Greene's prose compositions, than that they are indifferent works written by a man of genius.

GREGO'RIO, ROSA'RIO, born in 1753; he studied at Palermo, became a priest, and was made a canon of the cathedral of that city. He made himself known by his historical and antiquarian learning, which he applied especially to illustrate the history of his native country. In 1789 he was appointed Professor of Law in the University of Palermo. He was one of the first to suspect the imposture of the Maltese adventurer Vella, who had forged a pretended Arabic diplomatic code of the period of the Saracenic dominion in Sicily, and had succeeded in deceiving some men of learning, among others the Prelate Airoldi, who for a time patronized him. Gregorio having a strong suspicion of the imposture, applied himself to the study of Arabic, in order to be able to sift the whole matter; and the result was that he became convinced, and convinced others, of Vella's fraud, which was afterwards clearly exposed by the learned Hager of Vienna, in a journey which he made to Sicily in [illegible] An account of this curious controversy is found in the 'Fundgruben des Orients.' In 1790 Gregorio published a collection of Arabic historical works and documents concerning the history of Sicily: 'Rerum Arabicarum quæ ad Historiam Siculam spectant ampla Collectio,' 1 vol. folio, which he dedicated to King Ferdinand. It contains, 1, Novairi's 'History of Sicily;' 2, an anonymous 'Chronicle of Sicily,' from a MS. in the Library of the University of Cambridge; 3, Shehaboddin's 'History of Sicily;' 4, 'Extracts from Abulfeda's Annals which relate to the History of Sicily;' 5, Al Khatib's 'Chronological Series of the Dynasties of the Aglabites and Fatimites who ruled over Sicily;' 6, 'Historical Parallels of the Rulers of Sicily during the Saracenic Period;' 7, 'A Description of Sicily from Edrisi's Geography;' 8, 'Illustration of several Inscriptions in the Cufic Character found in Sicily;' 9, 'A Dissertation on the Calendar used in Sicily under the Arabs;' 10, 'A Sketch of the Geography of Sicily during the same period;' 11, 'Biographical Notices of Arabian Writers, natives of Sicily.' The Arabic text of the original historical works and documents is given with a Latin version, to which are appended copious notes by Gregorio. Some of the historical works had been previously published by Caruso, in his 'Bibliotheca Historica Regni Siciliæ,' but in a very imperfect and incorrect state, owing to Caruso's want of knowledge of Arabic. Having thus illustrated the Saracenic period, Gregorio undertook to illustrate also that of the Aragonese dynasty in Sicily, thus affording a continuation to Caruso's work above quoted, which extended through the Norman and Suabian periods: 'Bibliotheca Scriptorum qui Res in Sicilia gestas sub Aragonum Imperio retulere. Eam uti Accessionem ad Historicam Bibliothecam Carusii instruxit, adornavit, atque edidit Rosarius Gregorio, S. Panormitanæ Ecclesiæ Canonicus et us Juris publici Siculi Professor,' 2 vols. folio, 1791-2. collection contains the 'Historia Sicula' of B. de Neo- ; an anonymous account of the famous conspiracy of da, written in the vernacular Sicilian dialect; a narra- likewise in the Sicilian dialect, of the arrival at Catania ing Jayme of Aragon; the 'Historia Sicula ab a. 1282 37' of Speciale, and its continuation to the year 1361, by ael Platiensis, an anonymous history of Sicily from 1337 12, written in Sicilian; the chronicle of Simone di Len- and other chronicles; besides an ample collection of matic documents of the Aragonese period, illustrating aws and customs of that age. In 1794 Gregorio pub- d his 'Introduzione allo Studio del Dritto Pubblico Sici- ,' in which he examines the sources of the law of Sicily, arious constitutions of the Normans, Suabians, and Arago- , the 'consuetudines' of Sicily, and the proper method for ing and expounding the same. In 1806 he published the volume of his 'Considerazioni sulla Storia di Sicilia dai pi Normanni sino ai presenti,' a work which was afterwards ded to six volumes, the last two being published after uthor's death, and which supplies an excellent commen- on the history of Sicily. He also wrote 'Discorsi intorno Storia di Sicilia,' which have been likewise published his death, and in which he discards the fabulous stories ose who claimed for Sicily a remote civilization and ture of Phœnician or Asiatic origin, anterior to Greek ization. Gregorio assumed to prove that the earliest es in Sicily came from the West, and not from the from Iberia, Liguria, and Latium, and not from Syria.

egorio filled several offices under the government. He ade revisore or book censor, judge of the Ecclesiastical , and Regio Economo Ecclesiastico, or auditor of church rty. But his emoluments continued to be scanty until a time before his death, when he was presented to the cy of Santa Maria di Roccadia. He died in 1809. He of the writers who have done most for elucidating the y of Sicily: he was one of those single-minded studious who are to be met here and there amidst the vortex of olitan and Sicilian dissipation and sensuality, and who s it were in a world of their own, retaining a kind of tive simplicity which contrasts strangely with everything d them.

inà, *Prospetto della Storia letteraria di Sicilia nel Secolo II.*, Palermo, 1824-27.)

REGORY, OLINTHUS GILBERT, was born at ey, a small village in Huntingdonshire, January 29th, , of humble but respectable parents. At an early age he placed under the care of the celebrated mathematician Richard Weston, who was a contributor to the 'Ladies' ,' and other mathematical publications of his day. r his superintendence Mr. Gregory made much pro- in his studies, for at the early age of nineteen, and not fter leaving school, he published his 'Lessons, Astrono- and Philosophical.' Shortly afterwards he prepared an ent treatise on the 'Use of the Sliding Rule,' which he tted to Dr. Hutton, Professor of Mathematics, at the Military Academy, Woolwich. This treatise however ver published, though it contained many valuable and l applications of the instrument, useful for practical es. The writer of this notice was indulged with a of the manuscript a short time previous to the death of stinguished author. This work was the means of open- orrespondence between Mr. Gregory and Dr. Hutton, ripened into mutual friendship, and terminated only by

In 1798, Mr. Gregory removed to Cambridge to the editor of a provincial newspaper: he soon however ished the sub-editorship, and resolved to open a book- shop, at the same time announcing his intention to give tion in the mathematical sciences, and resolving to that profession alone which should prove the more ve. The encouragement he met with as a preceptor ly induced him to dispose of his books, and to devote ole attention to the occupation of a mathematical in- or. His correspondence with the 'Ladies' Diary' com- d whilst he resided at Yaxley, in the year 1794, and he ued to write for that useful periodical during his stay at ridge. In 1800 he published his 'Treatise on Astro- ,' which he dedicated to his friend and patron Dr. n. This work brought him into much notice, and in ear 1802, the Stationers' Company appointed him editor 'Gentleman's Diary,' and another of their annual pub- ns. About the same period he was appointed editor of Pantalogia,' and soon after, through the influence of Dr. Hutton, he was appointed a mathematical master in the Royal Military Academy. In this situation he rose through the various gradations of office, and on the resignation of Dr. Hutton he filled the professor's chair with the highest reputation, until obliged, through indisposition brought on by intense application to study, to resign it in June, 1838. The following is a list of his published works:—1793, Lessons, Astronomical and Philosophical, 1 vol.; 1801, Treatise on Astronomy, 1 vol.; 1802, appointed editor of the Gentleman's Diary; 1806, Treatise on Mechanics, 3 vols.; 1807, Translation of Haüy's Natural Philosophy, 2 vols.; 1808, Pantalogia, of which he was the general editor, and the contributor of about one-half, 12 vols.; 1810, Third volume of Dr. Hutton's Course of Mathematics, of which he composed about one-half: he afterwards edited an edition of the whole three volumes of the Course; also, Letters on the Evidence of Christianity, 2 vols.; 1815, Tracts on the Trigonometrical Survey; 1816, Plane and Spherical Trigonometry, 1 vol.; also, Dissertation on Weights and Measures; 1817, Account of his Pendulum Experiments and Astronomical Observations made at Shetland: this appeared in the Philosophical Magazine; 1818, appointed editor of the Ladies' Diary, and general superintendent of the Stationers' Company's Almanacs; 1825, Mathematics for Practical Men, 1 vol.; 1839, Address to the Gentlemen Cadets of the Royal Military Academy, on resigning the chair of Mathematics; 1840, Hints to Mathematical Teachers, 1 vol.; and Tables to be used with the Nautical Almanac.

Soon after the publication of his excellent treatise on Mechanics, the University of Aberdeen conferred on him the title of LL.D., but the work by which Dr. Gregory is best known is his 'Evidences of Christianity,' which has had an extensive sale. Dr. Gregory had the honour of being a member of almost all the learned societies in Great Britain and the continent, and was one of the twelve gentlemen who founded the Royal Astronomical Society, of which he was for some time the secretary. His connexion with the Ladies' and Gentleman's Diaries brought him into communication with young students who were desirous of distinguishing themselves in the exact sciences, and the period of his superintendence of those valuable works will be long remembered as that in which every meritorious contributor found a friend in the editor.

In 1823 Dr. Gregory was employed at Woolwich in making experiments to determine the velocity of sound. For this purpose he caused mortars, guns, and muskets to be fired at various distances from the observer; and his conclusion was that the velocity of sound, when not affected by the wind, is 1100 feet per second, when the temperature of the air is expressed by 33° (Fahr.); a result which agrees nearly with the results of experiments made at the same time on the continent.

Dr. Gregory's pleasing manners were completely in accordance with what might have been expected from the preceding remarks: all he did and said was dictated by benevolence of feeling, and he was a man of unbounded charity. As a Christian, he was moral and devout, and as a scholar he merited and obtained the consideration of the first mathematicians of the day; his great zeal in his vocation, his parental kindness, his earnest and impressive admonitions, his entertaining, improving, and philosophical conversation, and his ever-readiness to assist, will be gratefully remembered by many. He took a warm interest in the cultivation of mathematics, to which he may be said to have devoted, with the most indefatigable perseverance, nearly the whole of his valuable life. He died on Tuesday the 2nd of February, 1841, universally regretted by all who knew him, at his residence on Woolwich Common, in the 67th year of his age.

GRENADIERS are the tallest and strongest men of a battalion; they are embodied in one company, which is disposed at the head of the battalion when in column, and on the right flank when in line.

In France, as early as the year 1667, four men, appointed during a siege to throw grenades into the covered way of a fortress, and to take the lead in an assault, were distributed in each company of that which was called the king's regiment (infantry); and three years afterwards these men were formed into a separate company: subsequently every regiment in the French service had a company or two companies of grenadiers, and the regiment of guards had three: they were considered as the *élite* of the soldiery, being men of tried steadiness and valour. In 1676, the king of France instituted a company of cavalry designated horse-grenadiers, cut down obstacles in order to enable the troops to rush on the enemy.

The men in the first of the three regiments of foot-guards are now designated 'Grenadier Guards,' and the Scots Greys constitute a regiment of horse-grenadiers; in both of those regiments a high bear-skin cap is worn: but the men forming the grenadier companies of regiments of the line wear the same kind of caps, and, except slight peculiarities in the ornaments of the coat and hat, they are clothed and armed like other infantry soldiers.

GREUZE, JEAN BAPTISTE, a celebrated French painter, was born at Tournus in Burgundy in 1726. He was first instructed by Landon at Lyon; he studied also in the Royal Academy at Paris, and later at Rome. Nearly all Greuze's pictures are illustrations of the affections or domestic duties, their observance or violation: he painted but one historical piece—Severus reprimanding his Son Caracalla: portraits he painted frequently. Greuze is unique in the French school, and he is sometimes termed the Lachausée of Painting, and also less appropriately, the French Hogarth. He was fond of exciting and pathetic scenes; the following are some of his most celebrated pictures:—a Father explaining the Bible to his Family; the Blind Man cheated; the Good Mother; the Paralytic Father; the Unnatural Father; the Village Bride; the Huntsman's Return; the Broken Pitcher; the Little Girl and the Dog, 'La Petite Fille au Chien,' by some considered his best picture; l'Enfant au Capucin; la Dame de Charité; le Gâteau des Rois; la Fille Honteuse; la Bonne Education; la Paix du Ménage; la Prière à l'Amour; le Fils Puni, &c. &c., all of which have been engraved, and many by J. J. Flipart and the elder Massard; la Petite Fille au Chien, has been engraved by Ch. Porporati.

Greuze was long an associate or agréé of the French academy of painting, but as he was placed in the class of *genre* (du genre bas) painters, when he was elected a member, he considered it an indignity, and he retired altogether from the academy. He died March 21, 1805. In some earlier catalogues of the Louvre Gallery his birth and death are erroneously given as in 1734 and 1807 respectively; errors which have in consequence found a place in other works, as in Waagen's 'Kunstwerke,' &c. in Paris, but they have been corrected in later editions of the catalogue.

There are six pictures by Greuze in the Louvre—the Broken Pitcher; two companion pieces representing the departure from home and the return of a prodigal or dissipated son, entitled in the catalogue, Le Depart and Le Retour; the former has been sometimes misnamed the Father's Curse,

vile, knighted in 1597, sat repeatedly for his
in parliament, and continued to receive tokens
favour till the queen's death. King James wa
disposed, bestowing on him Warwick Castle (
paired at a large expense); but he is said to h
with Secretary Cecil, and did not obtain any
ment till after that minister's death. In 1615 he
under-treasurer and chancellor of the excheq
1620 he was raised to the peerage by the t
Brooke of Beauchamp Court. Next year, resi
in exchequer, he became a lord of the bed-ch
afterwards he founded a history lecture in the
Cambridge, endowing it with a hundred pounds
the 30th of September, 1628, being in his ma
born, he had an altercation with an old servi
irritated by what passed, stabbed him mortally
and then destroyed himself. Lord Brooke was
Mary's Church, Warwick, under a monument
himself erected, with this inscription—'Fulke
vant to Queen Elizabeth, counsellor to King Jam
to Sir Philip Sidney. Trophæum Peccati.'
married.

Three volumes of his writings were printed a
1, 'Certain Learned and Elegant Workes
Honorable Fulke Lord Brooke, written in h
familiar exercise with Sir Philip Sidney,' 163
This volume contains three didactic poems (
Human Learning, An Inquisition upon Fame
A Treatise of Warres), two tragedies on the m
(Alaham and Mustapha), Cælica (being a co
hundred and nine small poems, called sonnets
answering to the name), and two prose letters,
is really a long moral essay. 2, 'The Life of
Sir Philip Sidney: with the True Interest of
then stood in relation to all Foreign Princes,' &
12mo. 3, 'The Remains of Sir Fulke
Brooke, being poems of Monarchy and Religi
fore published,' 1670, 8vo. All known copies
of 1633 want the first twenty-two pages; an
conjectured that these contained the 'Treatise
and were cancelled as objectionable, probably
Laud. Short specimens of his poetry are select
bell and Ellis; his didactic poems are given at
Southey's 'Select Works of the British Poets,'
'Life of Sidney' was reprinted by Sir Egerton

Lord Brooke was alike proud of being Sidne
of being the patron of Camden, Davenant, and
letters. His own literary fame, in modern time

obscurity of language, caused partly by an anxious g after conciseness, partly by want of mastery over the ism of verse, and partly perhaps by indistinctness in f the conceptions which flowed in with such variety ftness upon his active and searching intellect. Southey d reason for calling Lord Brooke the most difficult of ts, but equally good reason for recalling attention to ctic poems.

Y, CHARLES, second EARL GREY, was born 13th, 1764, at Fallowden, near Alnwick, in Northum- His family was ennobled in the reign of Edward nd although the peerage became extinct, the family eight or nine generations been of consideration. In ir Charles Grey, the father of the second earl, was o the peerage for his military services, with the title on Grey de Howick, and in 1806 he was created Earl He died in November, 1807, in his seventy-ninth year. les Grey was sent to Eton, and before he had attained teenth year he proceeded to Cambridge, where he ed about two years, and then passed over to the Con- and made the tour of France, Spain, and Italy, which ed him about two years.

Grey's parliamentary career began in 1786, when he turned as member for the county of Northumberland. ched himself to the party and still more to the person Fox. In these days it will perhaps be considered nate that his maiden speech in the House of Commons 7 was in opposition to Mr. Pitt's commercial treaty ance. He contended that its tendency would be to England from the old and faithful allies with whom been associated in checking the long-cherished hostility ce towards this country; that the aim of France was polize the trade with the recently revolutionized Ame- ates with a view to the increase of her naval power; t this was an exception to be made to the general f entering into commercial treaties with other nations. s, at the age of only twenty-four, he was selected as he managers to conduct the trial of Warren Hastings; the following year he took a prominent part in the ons on the Regency Bill. Notwithstanding his youth e short time that he had been in parliament, he had attained a position of considerable eminence, and a putation as a speaker, at a time when Fox, Burke, and n were at the height of their fame as orators.

opening scenes of the French revolution, and still he future progress of that event, exercised for many n absorbing influence over both the foreign and do- policy of England. The Whigs were agitated by dif- s of opinion, which destroyed party ties and even p private friendships. Fox and Mr. Grey were the of the small but able party which constituted the ion during the first period of the French revolutionary Their object was, first to prevent the war, and after it mmenced their earnest desire was to bring it to a close. first acts of the French revolution were favourable to liberty; and the association called the Society of the of the People, which was formed in England early in with the object of obtaining a reform in parliament, ned by the more liberal men of the Whig party, and ey was one of the founders and most active members society. On April 30, 1792, at the request of the he gave notice of a motion for the following session subject of parliamentary reform. The motion was to ct that 'the evils which threatened the constitution nly be corrected by timely and temperate reform.' the motion could be brought forward in 1793, the f parties had undergone considerable change. The at least the more timid amongst them, had become ts, and a section of them under the Duke of Portland reparing already for the coalition with Mr. Pitt, which took place in 1794. Fox not only withheld his name he Society of the Friends of the People, but privately l himself to check its proceedings; and it had become r to stigmatize men of liberal principles as Jacobins vellers, if not atheists. The temptation to temporise he question of reform was great, but Mr. Grey rose it. On the 6th of May, 1793, he presented a petition he Society of the Friends of the People, which elabo- exposed the defects and evils of the existing system liamentary representation, and in a striking speech, ich however he did not put forth any plan, he de- d a recurrence to the principles of the constitution. ld appear from the replies of those who spoke against the motion, that Mr. Grey was ready to adopt universal suffrage, though in the abstract he disapproved of it, rather than that the existing defects in the representation should remain uncorrected. The motion was lost by 282 to 41. On the 25th of May an address was moved in support of a proclamation which the government had issued against seditious writings, when Mr. Grey assailed the minister and read the resolutions in favour of reform, which Mr. Pitt, with Cartwright and Horne Tooke, had agreed to ten years before at the Thatched House Tavern.

For many years, especially during the panic which existed in this country respecting 'French principles,' and in the midst of the extravagance in the public expenditure occasioned by the war, it was an arduous if not a thankless task which an earnest lover of constitutional rights like Mr. Grey was called upon by his sense of duty to discharge. The country was frequently in a critical state; the minister was supported by overwhelming majorities; and events perhaps occasionally warranted the executive in adopting bold and vigorous steps which were not precisely constitutional. Mr. Grey's opposition to the measures of the minister was at the time fruitless; but the vigilance of the small band of which he was the most active leader probably preserved the country from more daring inroads upon its liberties. In 1794 Mr. Grey endeavoured, though unsuccessfully, to obtain an inquiry into the conduct of government in bringing foreign troops into England without the consent of Parliament; and he was most zealous in opposing the suspension of the Habeas Corpus Act, which the government passed through all its stages up to the third reading in one day. In 1795 he opposed with equal vigour a bill which was calculated to limit if not to prohibit the holding of public meetings. On the 10th of March, 1796, he moved for a committee on the state of the nation, in which he animadverted on the enormous expenditure, the large advances made by the Bank, and the application of money to purposes different from those for which it had been voted by Parliament. On the 6th of May he brought forward a charge of misapplication of public money, in which false accounts had been made to conceal the malversation. In December he exposed another instance of the unconstitutional appropriation of the public money, in which 1,200,000*l*. had been advanced by the minister to the Emperor of Germany without the consent of the House of Commons, though Parliament was then sitting. In 1797 he was one of the committee of secrecy appointed to inquire into the circumstances connected with the stoppage of the Bank, and he dissented from the report which that committee made. In May he arraigned the minister for his conduct respecting the advances made to the government by the Bank, and accused him of having deluded the country by boasts of prosperity at a time when the Bank was on the verge of insolvency. On the 26th of the same month he again brought forward a motion for Parliamentary reform; and proposed that 113 members should be returned by the counties, each for one division, and that the franchise should be extended from freeholders to leaseholders and copyholders. The remaining 400 members were to be returned by household suffrage, and the elections were to take place on one and the same day. He intimated that if such a measure of reform were carried, he would, but not otherwise, shorten the duration of Parliament to three years. In the course of his address he intimated the likelihood of his not again taking part in the business of the House if his motion was rejected. On a division it was lost by 258 to 93; and it was not until 1799 that he again made his appearance in the House as a speaker, for the purpose of opposing the first propositions that were made for the union with Ireland. He was opposed throughout to this measure, but submitted a plan for securing the independence of the Irish members by abolishing forty rotten boroughs in Ireland; and he proposed that the addition of Irish members should not increase the numbers of the House of Commons.

The death of Mr. Pitt, in 1806, led to the formation of a Whig ministry under Lord Grenville. Mr. Grey, now become Lord Howick by his father's elevation, was appointed first lord of the Admiralty, and Fox held the seals of the Foreign Office. On the death of Fox in September, the office which he had held was filled by Lord Howick, who met Parliament in December as leader of the House of Commons. He and Lord Grenville were now at the head of the Whig party. The cabinet was broken up in March, 1807; but during its brief existence Lord Howick had carried through the House of Commons the Act for the Abolition of the Slave-Trade.

In November, 1807, on the death of his father, Lord Howick became Earl Grey, after nearly twenty years of his public life had been spent in the House of Commons. In the House of Lords he and Lord Grenville were the leaders of the opposition. One of his first acts as a peer was to protest against the attack upon Copenhagen in the previous year.

In 1809 Lords Grey and Grenville were invited by Mr. Perceval to join his administration, which had been just weakened by the retirement of Mr. Canning and Lord Castlereagh, but the offer was at once declined. On the Prince of Wales being appointed regent, Lords Grey and Grenville prepared, at his request, the answer to be returned to the addresses of parliament; but the prince, in the end, did not make use of it. Early in 1812 the regent addressed a letter to the Duke of York which he was authorized to communicate to the above two noble lords, in which he expressed a wish that 'some of those persons with whom the early habits of his public life were formed would strengthen his hands and constitute part of his government.' But as neither Lord Grey nor Lord Grenville could join the existing administration without a sacrifice of principle, it is needless to add that the prince's wish was not complied with. Again, on the death of Mr. Perceval, fresh negotiations were set on foot. The regent wished the cabinet to be composed of Lords Wellesley, Moira, Erskine, and Mr. Canning, and the terms offered to Lords Grey and Grenville were that they should be allowed to nominate four out of twelve, or five, if the cabinet were composed of thirteen ministers. On the ground that an administration formed on this principle would be inconsistent with the prosecution of any uniform course of policy, these conditions were not accepted. Lord Moira was then empowered to treat with the two noble lords unconditionally; but the negotiations were broken off in consequence of Lord Moira not being authorised to make the power of removing the great officers of the household a part of the arrangement. Something having occurred which induced Earl Grey to believe that he was personally obnoxious to the regent, his lordship expressed his willingness for his friends to take office without him, and promised them his cordial support in parliament. The negotiations eventually terminated in the formation of the Liverpool administration.

On the return of Napoleon from Elba, in 1815, Earl Grey was averse to hastily plunging into another war, and on this occasion he and Lord Grenville took opposite views. Earl Grey's character as a constitutional statesman never shone brighter than during the period of discontent and distress which the country experienced in the first few years after the peace. Force and terror appeared to be the main reliance of the government, but as Earl Grey had opposed this system when fear of the moral influence of the French revolution had led the minister to resort to it, so was he now equally desirous of showing that the best way of defending the constitution was to conciliate the affection and esteem of the people, and he urged that the natural mode of removing the discontent of the country was to remove its causes. He therefore condemned the measures of coercion adopted by the government. He moved for an inquiry into the conduct of the government respecting what has been called the 'Manchester massacre,' and though the motion was rejected by 34 to 155, two members of the royal family, the Dukes of Kent and Sussex, voted with the minority. He was strongly opposed to the punishment of transportation for seditious libel, from its liability to become a dangerous means of persecution and proscription. Earl Grey took an active part in the trial of Queen Caroline, and in opposing the Bill of Pains and Penalties which had been brought in against her. The Act for the Emancipation of the Roman Catholics, which was passed in 1829, realized one of the great objects of his political life. He gave his support to Mr. Huskisson's measures of commercial reform.

When Mr. Canning became prime minister, early in 1827, he was supported by most of the leaders of the Whig party; but Earl Grey, so far from joining his party in this course, bitterly attacked Mr. Canning and treated with contempt his pretended liberalism. Himself the model of a severe and inflexible patrician, with high connexions and a lofty public character, he seemed as if he regarded the prime minister as a brilliant and dexterous adventurer. The only persons who listened with pleasure to this speech were men whose principles Earl Grey's public life had been devoted to opposing; and yet no one supposed that this attack on the minister proceeded from any other than a sense of duty and a lofty moral tone combined with a peculiar temperament. This at the same time led him into a disdain of popular opinion
which was no less a feature of his character.
session he supported the amendment of the Duke
ton which led to the abandonment of Mr. Ca
bill. He knew how unpopular his vote on
would be; but 'if,' he said, 'there should co
between this house and a great portion of the peo
is taken; and with that order to which I be
stand or fall;' and, he added, 'I will maintai
hour of my existence the privileges and indepen
House.'

The period was now approaching when, as the
of his long political life, he was to undertake the
of the representative system, the object for whic
energies had been exerted in unfavourable ti
1830 the slightest measure of parliamentary refor
resolutely denied. The Duke of Wellington, w
minister when the Parliament met which was el
death of George IV., affirmed, in allusion to som
Earl Grey had said, that 'the legislature and t
representation possess the full and entire confi
country, and deservedly possess that confidenc
second revolution in France, which had just o
given a great impulse to questions of political re
reign and a new parliament had commenced un
fluences; and the country generally was in a d
excited state. The duke's administration was
yield to the influence of these circumstances
office. Earl Grey was sent for by William
quested to form a new cabinet. He announc
minister that 'Peace, Retrenchment, and Refo
the objects of his policy. On the 1st of March
John Russell, as the organ of the cabinet, in
first Reform Bill into the House of Commons.
tory of this measure is given in William IV.,
xxvii. p. 401. On the 7th of May, 1832, Lord
carried an important motion, which, it was consid
cabinet, placed the Reform Bill in peril, and they
resigned office. The ministerial interregnum was t
May 17 by the return of Earl Grey to power. T
dence of the House of Lords was for the ti
destroyed, and means were used, with the king's
prevent the peers who were opposed to the Refor
attending in their places to vote against it. Th
been an inconsistency in Earl Grey, who had so la
himself in favour of the independence of the Hous
but he had to choose between successfully carry
plan of parliamentary reform and a violent political
On the 4th of June the Lords passed the bill by
and three days afterwards it received the royal ass

The first Reformed Parliament met on the 29th of
and its first measures were the abolition of colo
the abolition of the East India Company's mo
reform of the Irish church, and the reform of the
The cabinet was early shaken by some personal ch
March, 1833, Lord Durham was compelled to re
illness. At the end of May, 1834, Mr. (now Lord
Sir James Graham, the Earl of Ripon, and the
Richmond, left the ministry on account of differe
their colleagues. Earl Grey had considered a Co
necessary for Ireland, and a misunderstanding arose
O'Connell on the subject, which in July led to his
resignation and that of Lord Althorpe. Lord Alt
turned to office in about a week, but the cabinet,
longer possessed the confidence of William IV., was
in the following November, when Lord Althorpe, by t
of his father Earl Spencer, was removed to the House o

For one or two years after his retirement from off
Grey occasionally attended the House of Lords, but
ten years of his life were passed in retirement surrou
a numerous family and honoured by the general res
veneration of his countrymen. He died at his seat,
House, in Northumberland, July 17, 1845, in his eighty
year. The personal appearance of Earl Grey was sta
commanding; his action graceful and animated;
voice strong, flexible, and sonorous. As a speaker
was pure and his manner free from affectation. He
ried on the 18th of November, 1784, to Mary Elizab
daughter of the Right Honourable William Brabazon
by, afterwards first Lord Ponsonby, and by her he
sons and six daughters. His widow, eight of his
four of his daughters, survived him. Henry Geor
third Earl Grey, better known as Lord Howick, was
time a member of Lord Melbourne's cabinet.

AS, a genus of plants belonging to the natural order cæ. It has the tube of the calyx adhering to the ; the limb small, 4-cleft, obtuse; the petals 4, coria- the stamens numerous, inserted in a square disk; the ts joined into 5 series at the base; the inner ones very the anthers kidney-shaped, small; the style wanting; ma cruciate, hidden in the incurved stamens; the fruit 8-furrowed, crowned by the calyx. There is but one *G. cauliflora*, the Anchovy pear. It is a tall little- ed tree with very long oblong leaves, and large white seated on short many-flowered peduncles. It is a native lpine districts of Jamaica in boggy places. The fruit ovate berry the size of an alligator's egg, and of a h russet colour, and is pickled and eaten in the same the mango. It is readily propagated by seeds, and ng plants must be kept in a moist heat. It grows best amy soil, and may also be propagated by large cuttings under a hand-glass in heat.

n, *Gardener's Dictionary.*)

FFITH, WILLIAM, was born in the year 1810, ving been destined for the medical profession, he com- his education at University College, then called the University. He distinguished himself in the medical but more especially in that of botany, of which Dr. was the professor. He went out to India as an assist- eon on the Madras establishment, where he arrived on of September, 1832. Shortly after his arrival he pointed by the Bengal government to examine the of Tenasserim. In 1835 he and Dr. M'Clelland ected to accompany Dr. Wallich into Assam for the of reporting upon the growth of the tea-plant. From e proceeded in company with Dr. Bayfield to examine unexplored tracts which lie beyond Luddya and Ava, xtreme frontier of the eastern territories of Great Bri- n 1837 he was appointed to accompany Captain Pem- n his mission to Bootan. Two years afterwards, in 1839, ent with the army of the Indus to examine the character egetation of Afghanistan. During these several jour- lost no opportunity of making observations and collect- ects in natural history. Although his appointments had regard to his botanical knowledge, his reports, and written during his journeys, as well as his papers, show re was little of interest to the naturalist that escaped his

In his travels he collected both plants and animals. ecting plants he had the object in view of writing a f India, and to this great work he never ceased to himself. Many of his zoological specimens have been Europe, and have been described and published by naturalists. He devoted much time to the fresh-water India, of which he made a large collection, and an of them has been given in the 'Calcutta Journal of History.' At the time of his death his collection of nsisted of about six hundred specimens, affording per- of the most extensive and instructive illustrations of raphical distribution of the birds of India extant.

41 Griffith was appointed to the medical duties at and upon Dr. Wallich's absence owing to illness, appointed to the superintendence of the Botanical at Calcutta, and the duties of the Professor of Botany edical College. On the return of Dr. Wallich he his place at Malacca, and was there seized with the f his liver, which terminated his existence on the 9th ary, 1845.

h's was rather a life of promise than fulfilment. He ated in England at a time when the blind deference as paid to the authority of Linnæus as the end of inquiry was beginning to pass away under the of the writing and teaching of the present professor at University College; and when the genius and y philosophical views of Robert Brown were appreciated by his countrymen. He saw the right of botanical investigation, and in the wide field for which his residence in India afforded aimed at some- re than the collecting of specimens and the descrip- pecies. His life was too short to observe much, and illness too rapid to afford opportunity for publishing the results of his observations. He has however left attered in journals and Transactions, which indicate raordinary powers of observation, and throw much he subjects on which they treat. Of these papers those e at present best known are three 'On the Ovulum um, Osyris, Loranthus, and Viscum,' in the 18th and lumes of the Transactions of the Linnæan Society. These papers consist of an account of a series of microscopical observations on the development of the embryo in the ovule of the plants named. [EMBRYON, P. C. S.]

During the last session (1844-5) of the Linnæan Society he contributed a paper on the structure and relations of the various forms of Rhizanths. In this paper he pointed out the relation of these plants to certain exogenous forms of vegetation, and advocated the abolition of the Rhizantheæ as a distinct class in the vegetable kingdom. This paper is not yet published. Amongst other contributions to botany by Griffith may be named—A Memoir on the structure of Salvinia and Azolla, in the 'Calcutta Journal of Natural History;' a description of two genera of Hamamelidæ, two species of Podostemon, and one species of Kaulfussia, in the 'Asiatic Researches;' on the family of Rhizophoreæ, and a report on the tea-plant of Upper Assam, in the Transactions of the Agricultural Society of Calcutta.

The materials collected by Griffith for his work on the Flora of India, as well as his zoological museum, have been consigned to the Directors of the East India Company; and it is to be hoped that they will not be entirely lost to science by the death of their able and indefatigable collector.

GRIMALDI, GIOVANNI FRANCESCO, called *Il Bolognese*, a celebrated Bolognese painter, born in 1606, was the pupil and relation of the Carracci. He was particularly excellent in landscape, both as a painter and an etcher: he etched some of the landscapes of Titian. He painted also history and portrait, and was employed by Louis XIV. and the Cardinal Mazarin for three years at Paris, painting in the Louvre and in the cardinal's palace. He was also much employed by Innocent X. at Rome, in the Vatican, in the Palazzo Quirinale, and in the Church of San Martino a' Monti; and there are some good landscapes by him in the Colonna Palace. He died at Rome in 1680: Pietro Santo Bartoli married one of his daughters. His son Alessandro assisted him in some of his works; he was a good painter in a similar style as his father.

(Malvasia, *Felsina Pittrice;* Gandellini, *Notizie Istoriche degli Intagliatori;* Lanzi, *Storia Pittorica*, &c.)

GRIMALDI, FRANCESCO MARIA, an Italian philosopher, and a member of the order of Jesuits, was born at Bologna, in 1619. His education being completed, he was, according to Montucla, employed during several years in giving instruction in the belles-lettres; and during the latter part of his life he applied himself to the study of astronomy and optics. He died at Bologna, in 1663, in the forty-fourth year of his age.

Grimaldi was associated with Riccioli in making astronomical observations, and he gave particular descriptions of the spots on the moon's disk. It was asserted by Montucla that Grimaldi gave to those spots the designations by which they are now distinguished among astronomers; thus superseding the names of the mountains and seas of the earth which had been given to them by Hevelius: but this is apparently a mistake.

That which has given celebrity to Grimaldi is his work entitled 'Physico-mathesis de Lumine, Coloribus, et Iride aliisque annexis,' which was published at Bologna, in 4to., in 1665. The greater part of the work consists of a tedious discussion concerning the nature of light, the conclusion of which is that light is not a substantial but an accidental quality; the rest, however, possesses the highest interest, since it contains accounts of numerous experiments relating to the interferences of the rays of light. A description of the work is given in the 'Philosophical Transactions' for that year.

Grimaldi, having admitted the sun's light into a dark room, through a small aperture, remarked that the breadths of the shadows of slender objects, as needles and hairs, on a screen, were much greater than they would have been if the rays of light had passed by them in straight lines. He observed also that the circle of light formed on a screen by the rays passing through a very small perforation in a plate of lead was greater than it would be if its magnitude depended solely on the divergency of the rays; and he arrived at the conclusion that the rays of light suffer a change of direction in passing near the edges of objects: this effect he designated 'diffraction.' By Newton it was, subsequently, called 'inflexion.' He found that the shadow of a small body was surrounded by three coloured streaks or bands which became narrower as they receded from the centre of the shadow; and, when the light was strong, he perceived similar coloured bands within the shadow: there appeared to be two or more of these, the number increasing in proportion as the shadow was farther from the body.

Having admitted the sun's rays into a room through two small circular apertures, Grimaldi received the cones of light on a screen beyond the place where they overlapped each other; and he observed, as might be expected, that, within the space on which the rays from both apertures fell, the screen was more strongly enlightened than it would have been by one cone of light; but he was surprised to find that the boundaries of the penumbral portions which overlaid one another were darker than the corresponding portions in which there was no overlaying. This phenomenon of interference was, at the time, enunciated as a proposition:—'That a body actually enlightened may become obscure by adding new light to that which it has already received.'

Grimaldi also observed the elongation of the image, when a pencil of light from the sun is made to pass through a glass prism: but he ascribed the dispersion of the light to irregularities in the material of which the prism was formed; and he was far from suspecting the different refrangibilities of the rays. The discovery of this fact, which has led to so many important consequences in physical optics, was reserved for Newton.

(*Biographie Universelle*; Montucla, *Histoire des Mathématiques*.)

GRISTHORP BAY, a locality on the coast of Yorkshire, famous for the occurrence there, more remarkably than elsewhere, of numerous Cycadeöid plants, Lycopodites, Ferns, &c., in strata of the Bath oolite series.

GROATS, or GRITS. [AVENA, P. C. S.]

GROS, ANTOINE JEAN, BARON, one of the most distinguished of the recent French painters, was born at Paris in 1771. He was the pupil of David, and some of his earlier pictures are in the dry manner of that painter. One of his first works of note was Bonaparte on the bridge of Arcola, in the celebrated battle of that place, exhibited at the Louvre in 1801. In 1804 he exhibited his celebrated large picture of the Plague of Jaffa, with Bonaparte visiting the sick, to whom he has given a most disgusting appearance, though the whole displays great vigour and power: it is now at Versailles: there is a large print of it by Laugier. He painted also several other large pictures, as—the Battle of Aboukir; the Battle of the Pyramids; Napoleon visiting the Field of Eylau, after the battle; the Battle of Wagram; the Capture of Madrid by Napoleon; and other subjects from the history of France during the eventful years of the early part of this century. His masterpiece, however, is considered the Cupola of St. Geneviève, at Paris, executed in oil, in 1824, and for which he was created Baron; it exhibits the saint as guardian of the throne of France, which is represented by Clovis, Charlemagne, St. Louis, and Louis XVIII.; but though gorgeous and effective, it belongs strictly to the school of ornamental art: the drawing is correct, and the colouring is florid, but the composition and expression are very ordinary.

The pictures of Gros generally are conspicuous for vigour and facility of execution, but they are at the same time extremely coarse, sometimes in treatment as well as handling; they show little or no delicacy of feeling, and they are quite void of all pictorial refinement of tone and modelling, and are equally void of sentiment. Perhaps Sappho leaping from the promontory of Leucate, on the Island of Leucas, may be considered an exception to his prevailing style: there is a good print of it by Laugier. His picture also of the Visit of Francis I. and Charles V. to the Abbey of St. Denis is executed in a very superior style to his battle-pieces and similar large works: it has been admirably engraved by Forster. This and the Battle-field of Eylau are in the Louvre. Gros has painted also some excellent portraits.

. He died at Paris, June 26, 1835. He was professor of painting at the Ecole Royale des Beaux Arts; member of the Institute; officer of the Légion d'Honneur; and knight of the order of St. Michel.

(Gabet, *Dictionnaire des Artistes de l'Ecole Française, au dix-neuvième Siècle*; Réveil et Duchesne, *Musée de Peinture et de Sculpture*, &c.; *Notice des Tableax exposés dans le Musée Royal*, 1841; *Kunstblatt*, 1836.

GROTIUS, WILLIAM, was born in 1597, at the Hague. He was the younger brother of Hugo Grotius, who directed his studies, and always behaved towards him with the greatest kindness. William Grotius became a learned and prosperous lawyer. He died at the Hague in 1662.

William Grotius collected and published at Leyden, in 1617, the Latin poems of his brother, in 12mo. He himself wrote 'Isagoge ad Praxin Fori Batavici,' Amst 1655, 4to.; 'Enchiridion de Principiis Juris Hague, 1667, 4to.; 'Vitæ Jurisconsultorum quorum in dectis extant Nomina,' Leyden, 1690, 4to.

(*Biographie Universelle*; Watt's *Bibliotheca Bri*

GROWING CROPS. [EMBLEMENTS, P. C. and P. C.

GUANO (from the Peruvian word *huanu*, which dung) is the excrement of sea-fowl, and was manure probably for ages before Peru was visited by niards. It is spoken of by Herrera in a work Madrid in 1601; by Garcilaso de la Vega in his 'riales Reales,' published at Lisbon in 1609; and by in his 'Voyage.' Garcilaso de la Vega says that 'in time of the Incas there was so much vigilance in these birds (the sea-fowl), that during the rearing person was allowed to visit the islands which they under pain of death, in order that they might not be ened and driven away from their nests. Neither allowed to kill them at any time, either on or off the under the same penalty. Each district or territory portion of these islands allotted to it.' A recent traveller, Meyer, in his 'Reise um die Welt,' says, 'almost the whole coast of Peru this excrementitious covers the small islands and cliffs near the coast, and spots lies in such enormous beds as could only be produced the accumulation of thousands of years.' The same states that guano is an important article of commerce in Mr. Thairlwall, of Richmond, Yorkshire, who has the western coast of South America, describes a small about three miles in circumference, in 13° 44′ S. lat., which guano is deposited in a solid mass two hundred feet depth. The surface is coated over with a thick of almost pure muriate of ammonia; and when the bulk disturbed, the ammonia given out is so strong as to respiration, and to cause an unpleasant sensation in the eyes. Peruvian guano is imported into England only by two agents, one at Liverpool and the other in London. About the commencement of 1843 guano was discovered on the island of Ichaboe, about two miles and a half from the land of Africa, in 26° 13′ S. lat. and 14° 15′ E. long. The place soon attracted notice, and by the end of 1844 the of the guano had been carried away. As many as three dred and fifty ships have been anchored off the island at the same time. The guano was from thirty-five to thirty- feet in depth, and the deposit extended to a length of about 1100 feet, with an average width of 400 feet. Towards the close of 1844 another guano island (Malagas) was discovered at the entrance of Saldanha Bay. The guano covers an tent of about eight miles, and gradually increases in thickness from about four yards to eight yards. It is obtained for ment by a licence from the collector of customs at Town. In October, 1845, a cargo of guano was brought to this country from Patagonia. It has been supposed that the excrement of the sea-fowl which swarm on some parts of the coast of Great Britain might be used as a fertilizer with the same results as Peruvian or African guano; but the quantity which could be collected is comparatively small, as the accumulation is in most cases washed away by the rains, and the valuable properties of that which remains are dissipated by the changeable nature of our climate. In South America Africa the dryness of the climate allows the guano deposits successive years to accumulate, and the heat of the sun duces a coating of the surface which preserves its virtue manure. The superiority of the Peruvian over the African guano is owing chiefly to the greater dryness of the climate.

The value of guano is to be estimated according to the portions which it contains of—1, ammonia; 2, phosph 3, organic matter. The result of a number of analyses Peruvian and African guano show the following variation their composition:

	Peruvian.	African.
Water	12 to 15	25 to 30
Organic matter .	50 to 60	25 to 30
containing	12 to 15 parts of ammonia	5 to 3 parts of ammon
Phosphate of lime	15 to 25	25 to 30
Fixed salts . .	—	8 to 10

African guano has the largest proportion of soluble and that from Peru is remarkable for the quantity of uric that it contains, an element which dissolves very slowly. African guano may therefore act with greater rapidity, the effect of Peruvian is felt for a longer period.

Good Peruvian guano sells at 10*l*. or 11*l*. per ton, and A *l.* 10*s.* The article is extensively adulterated, have occurred in which the adulterated matter ie extent of 97 per cent. Umber, stone, ground rder, various earths, old mortar, and partially iw-dust, are employed for this purpose. The istened with putrid urine and re-dried. Even differs so frequently in quality, that it is never irchase it without a satisfactory analysis. Pur- en deluded with false analyses, and those who importers are not always safe. Dr. Ure ad- er before he buys to obtain an analysis of a com- , and then to cork up a sample in a bottle, and f his crops disappointing reasonable expecta- better position for obtaining satisfaction for any ay have been practised upon him. Farmers' tain a respectable chemist at a salary on condi- ould perform analyses for the members at a This is what in effect is done by the Agri- istry Association of Scotland, and the conse- scarcely a single sample of adulterated guano d for sale in that country.

iano may be easily compounded by an admix- istituents of natural guano, all of which, with of bone-dust, may be procured of any druggist. son gives the following recipe for an artificial will produce an effect about equal to one cwt. ano :—78¾ lbs. bone-dust, 25 lbs. sulphate of . of pearlash, 25 lbs. common salt, 2½ lbs. dry da; total, 132½ lbs. The following artificial uano has been successfully used, at the rate of e :—

solved in spirits of salt instead of vitriol		18¾ lbs.
powder	about	18¾
f ammonia (gas salt)	about	9½
salt	about	9½
		9½
es	about	46
soda (cubic petre)		28
f soda (Glauber salts)		10
f magnesia (Epsom salts)		10
		158 lbs.

4 cwts. of guano, which is the usual quantity acre, are equal in effect to fifteen tons of farm- Ir. Lawes, an experienced agricultural chemist, wing table of the constituents of these two

Guano.

iate of lime	112 lbs.
nia	54
ic matter	171
, soda	30

Dung.

iate of lime	100 lbs.
nia	195
ic matter	8505
, soda, and silica	1335

have been made, the results of which showed f good Peruvian guano were equal to twenty arm-yard dung; but much more is required guano and other hand-tillages recently intro- heir exact value can be fully settled; and this ertained by extensive experiments under every circumstances. The question may also arise, and other stimulating fertilizers do not exhaust hey produce great immediate results. This has in California, according to a statement recently though such deterioration of the soil is compara- consequence where there is abundance of wild in which guano leaves the soil is an important a country like England. There are other deration, of the real nature of which little is at ; but it may be sufficient to allude to some aken in 1844, by the Agricultural Chemistry Scotland, in which it was found that turnips ely by means of dung and guano presented erences in their chemical constituents; and it ertained that the cattle which fed on the dung- hrove more rapidly.

ation of guano care should be taken to prevent contact with the seed. The guano must be ree times its bulk of finely pulverized earth, eral ashes, &c.; but for cold soils the proportion of guano may be increased, and the quantity to be applied per acre may vary from two to four cwts., according to the nature and quality of the soil. It is important that rain should follow the application of guano within a short time, and a wet season is generally considered most favourable to its success. For various crops the guano answers best after vegetation has commenced; and it is useful in some cases to apportion the quantity intended to be used per acre into two or three portions for sowing at intervals, but the intervals most favourable are not fully determined. For small allotments or gardens it is often most convenient to use guano in a liquid state, in which case 4 lbs. of guano may be mixed with twelve gallons of water, and used after it has stood twelve hours, and the proportion per acre may be from a half to one cwt. of guano to 160 gallons of water.

In the year ending the 5th of July, 1844, the quantity of guano imported into the United Kingdom was 36,628 tons, which would cost nearly 300,000*l.* to the agriculturist.

(*Supplement to* Rham's *Dictionary of the Farm*; see also *Journal of the Royal Agricultural Society*; *Journal of the Highland and Agricultural Society*; *Gardener's Chronicle*, edited by Dr. Lindley.)

GU'BBIO, ODERI'GI DA. [ROMAN SCHOOL OF PAINTING, P. C., p. 76.]

GUERIN, PIERRE NARCISSE, BARON, a distinguished French painter, born at Paris in 1774, was the pupil of J. B. Regnault. His works are the perfection of manner in imitation of the antique; they display notwithstanding great skill and perseverence. By antique manner in painting is meant what may be termed a literal translation into colour of the common characteristic ideal forms of Greek sculpture and bassi-rilievi, without giving them life or motion; such pictures are evidently paint, and sometimes have the effect of a show of painted statues, in which each figure is independent of its neighbour. The works of Guerin may be justly censured for this defect, even more so than those of David; but it is perhaps made more obvious in the works of Guerin, as his subjects are mostly antique and in antique costume. The following are his principal works:—The first which attracted general attention was—Marcus Sextus, having escaped the proscriptions of Sulla, returns, and finds his daughter weeping by the side of her dead mother; exhibited in 1798: in 1802, he exhibited an Offering to Æsculapius, and Hippolytus accused by Phaedra, brought before Theseus; in 1808, Bonaparte pardoning those who had revolted at Cairo; in 1810, Pyrrhus and Andromache, and Cephalus and Aurora; in 1817, Dido listening to the story of Æneas, Ægisthus urging Clytemnestra to murder Agamemnon, and St. Geneviève. All these works have been engraved; the Cephalus and Aurora by Forster: this subject is suited to Guerin's style, and it is one of the most beautiful of his works; it is in the Somariva collection. Æneas recounting the fate of Troy to Dido, likewise engraved by Forster, is a gorgeous and elaborate work, especially in costume and accessaries; but it wants chiaroscuro, and has the defect already noticed in the highest degree; every thing is of the same substance and texture; it wants dramatic effect wholly; Æneas is not relating nor is Dido listening; it is a mere juxtaposition of four elaborately painted figures, Æneas, Dido, Ascanius, and Anna: it is now in the Louvre. The following five works are also in the Louvre—Marcus Sextus, Phaedra and Hippolytus, the Offering to Æsculapius, Clytemnaestra, and Andromache. The 'Révoltés du Caire' is at Versailles.

Guerin was appointed a professor in the Ecole Royale des Beaux-Arts, in 1814; and he was some years director of the French Academy at Rome: he was created Baron after his return from Rome in 1829. He died at Rome, July 16, 1833, whither he had returned for the sake of his health, which was delicate. He was member of the Institute and many foreign academies, and chevalier of the Legion d'Honneur and of the order of St. Michel.

(Gabet, *Dictionnaire des Artistes de l'Ecole Française au XIX^e. Siècle*; Réveil et Duchesne, *Musée de Peinture et de Sculpture*; *Notice des Tableaux exposés dans le Musée Royal*, 1841.)

GUERNSEY. Since the publication of this article in the 'Penny Cyclopædia' some very important changes have taken place in the laws and constitution of that island. In the year 1838 a petition, signed by several hundred rate-payers, was presented to the Bailiff and jurats, praying for a reformation in the law of wills and inheritance. According to the then existing law, chiefly derived from the old Norman code, real property descended as follows: two-thirds of it were divided among the sons, and one-third among the daughters, with a provision that, in no case, could a daughter's share exceed that of a son. The eldest son had the additional privilege of choosing about half a vergee of land (about one-fifth of an English acre), estimated as naked ground, and consequently he might select in the different parts of the estate the portions of land on which stood the most valuable buildings. This right was termed 'le Préciput.' In particular cases, likewise, all the sons were together entitled to the twentieth part of the estate, called 'Le Vingtième,' in addition to their ordinary share. In collateral successions a sister could not inherit real property from a brother or sister, so long as there were other brothers or their descendants living, and, as real property could not be left by will, cases of occasional hardship occurred. This last circumstance chiefly gave rise to the petition above alluded to; the principal points contained in it were sanctioned by the States of the island, and on the 3rd of August, 1840, an order of the Queen in Council was registered on the records of the court, which materially modified the law of real property in Guernsey. The following are the most important changes:—The right of 'vingtième' was abolished for all sons who had not attained their fourteenth year when the law was passed. The eldest son's right to the 'préciput' was continued, subject however to certain modifications, the principal of which was, the obligation to take it in a single enclosure, even should that enclosure not contain the quantity of land usually assigned as a 'préciput.' In collateral successions to inherited real property, neither males nor descendants shall in future exclude females or their descendants, but the relatives of both sexes belonging to the line whence the property descends, shall divide the estate by branches, in the same proportion as in successions in the direct line. In collateral successions to *personal* and *purchased real* property, neither males nor their descendants shall exclude females nor their descendants, in parity of degree, but the nearest of kin to the deceased, in parity of degree, both males and females, shall share the property in the same proportion as property of this nature, whether personal or real, would be shared in succession of the direct line. Ascendants, having no descendants living, shall inherit the *personal* and *purchased* real property of the last of their descendants.

Coincident with these changes in the law of inheritance was a reform in the law of wills. The feudal law, which was till lately that which chiefly guided the division of property in the island, was opposed to the principle of wills. By the antient law, a person who left neither wife nor children, could dispose by will of all his personal property, but he could never give more than one-third of his real property by deed of gift during his lifetime, whether he had inherited or purchased it; under no circumstance could he leave by will any portion of his real property. At present, a person who leaves neither wife nor descendants is allowed not only to dispose of all his personal property by will, but he may do the same with his *purchased* real property, and even with real property *inherited*, provided he leaves no relations within the second degree in a collateral line.

The above are the principal changes which have taken place in the laws of the island. The information may be useful to those who visit the Channel Islands, and who are induced to reside there from the many advantages they enjoy, not the least of which is the prevailing custom to exempt from local taxation strangers not possessed of real property in the island, and not carrying on any trade or profession, and the absence of all duties on imported goods, with the exception of a small duty on spirits.

The constitution of the States of the Island has likewise undergone a material reform. The States of Deliberation were formerly composed of thirty-two members, as mentioned in the former article on Guernsey. The grievance complained of was the comparatively small influence of the town parish in that assembly. With a population greater than half that of the entire island, it sent but one representative to the States; whereas the nine country parishes had each their representative. To counterbalance in some measure the preponderating influence of the country, it was proposed by the States, and finally sanctioned by an order of the Queen in Council, dated December 13th, 1844, to divide the town parish into four cantons or districts, without however interfering with the antient corporation now called the Central Douzaine, and which is composed of twenty-two members, including the two constables or chief police officers. The rate-payers in each of the four cantons choose twelve members for life to represent them in the States of Election for the choice of a Jurat, and these twelve members select one of their body to represent them at each assembly of the States of Deliberation, and the Central Douzaine two members. Thus the representation of St. Peter's Port was increased from one to six members in the States of Deliberation, making the entire number thirty-seven; and from twenty-two to seventy in the States of Election, making the entire number 222. The constables by this new arrangement ceased to be 'ex-officio' the representatives of their respective douzaines; each douzaine throughout the island was in future to send, at every assembly of the States, any one member they might choose out of their body. It was likewise provided in the order in council, that no general tax should be raised by the States of Deliberation except with the consent of a majority of two-thirds of the members present; and no tax exceeding one penny on every twenty pounds capital, except with the consent of her Majesty in Council, signified through one of the principal secretaries of state.

Considerable improvements have taken place in the island within the last twenty years. Good macadamized carriage-roads now lead from the town to almost every part of the country. Many buildings, both public and private, have been erected. The number of houses in St. Peter's Port, which in 1831 was 1810, had risen in 1841 to 2212. The population of the whole island during that period has increased from 24,349 to 26,705, and including the adjacent islands belonging to the bailiwick, Alderney, Sark, Herm, and Jethou, to 28,578. The effective strength of the militia is about 2600 men from sixteen to forty-five years of age, and is divided into four regiments and an artillery battalion. The total number of births in St. Peter's Port from October, [illegible], to October, 1844, was 188, and of deaths 141; and in the whole island, 462 births to 322 deaths; thus, taking the population of the island at that period at 27,000, the annual mortality, as appears by an extract from the Registry Office, is only about one in eighty-three, or more nearly one in eighty-four. The climate, no doubt, is the chief cause of this low rate of mortality; it nearly resembles that of the coast of the south-west of England, the prevailing winds being westerly, though the east wind is frequent in spring. The cold in winter is moderate; many winters passing without snow, and frosts of long continuance are rare. The mean winter temperature has been ascertained to be about 41° 6′, which is 5° 11′ higher than that of London; that of the summer at 60° 7′, which is about 1° lower.

In the town of St. Peter's Port a Mechanics' Institution was established in 1831; it has now nearly 300 members, and its library contains upwards of 3000 volumes. The savings-bank has a rapidly increasing number of depositors: the total amount of investments up to the year ending Aug. 20th, 1845, being 82,392*l.*, divided among 3137 depositors. There are also two well-established joint-stock banks, conducted chiefly on the Scotch system, and issuing one pound notes; every individual shareholder is, by the law of the island, liable to the full extent of his property, both real and personal. The shipowners established in 1838 a mutual insurance society, and the amount of shipping insured during the present year is 84,870*l.* Some idea of the increasing wealth of this island may be formed from the fact that in the year 1740 the total amount of property taxed in the town of St. Peter's Port was only 21,894 quarters, which represents a capital of 437,980*l.*; the highest tax was rated at 600 quarters, or 12,000*l.* belonging to a single individual. Whereas in 1844 the same parish was rated at 150,355 quarters, or 3,007,100*l.*; the highest individual tax being rated at [illegible] quarters, or 160,000*l.* It must moreover be borne in mind that the above does not represent the full amount of property, as a great number of persons having only seven or eight quarters are not rated.

The annual net revenue of the States in 1843 was [illegible], raised chiefly by a duty on spirituous liquors of one shilling per gallon. There is however a debt incurred of about 89,000*l.*, the greater part of which sum has been expended on public buildings.

The state of trade is not at present very flourishing, and in that respect this island is very far behind its neighbour Jersey. In the year 1844 St. Peter's Port possessed 125 vessels, the largest measuring 288 tons. In the same year there were 26,414 imperial quarters of foreign wheat imported, and 11,317 exported. There is almost daily steam communication between the Channel Islands and the port of Southampton, from whence the English mail is conveyed three times a week, and the

mouth and Torquay, and also between St. Maloes and
lle in France.

it attention is paid to agriculture, and many improve-
have been introduced by means of an agricultural and
horticultural society, established, the former in 1816,
latter in 1832; the land is divided into a large number
old estates, many of not more than four or five Eng-
es in extent, and none larger than seventy; very few
bove forty. Long leasehold tenure is unknown, but a
art of the land is heavily burdened with a species of
mable mortgage peculiar to the Channel Islands.
lue of land is extremely high, the rent may be said to
from 5*l.* to 7*l.* the English acre; building-ground near
n is sold at very high price; in the town itself it has
own to fetch at the rate of 30,000*l.* the English acre.
to the care taken in the cultivation the produce is great;
as fifty-four Winchester bushels of wheat have been
n an acre. The ashes of sea-weed is the manure
sed for corn crops; the cost of manuring with it is
10*s.* the English acre.

cclesiastical condition of the island has likewise un-
a favourable change. A new district has been formed
e town parish, in which a church, dedicated to St.
gether with a residence for the minister, has been
subscription, the district now forming a perpetual
he patronage of which is in the gift of five trustees.
sh church of St. Peter's, which, in point of internal
ure, is considered one of the finest in the diocese of
ter, consists of a chancel, nave, north and south aisles
epts, with a square tower at their intersection; it ap-
have been built at the commencement of the four-
ntury, the style is the later Gothic of France, termed
boyant;' several of its fine windows have lately been
it is capable of containing about 1200 persons.
e in the parish of St. Peter's Port, besides these two
three other churches or chapels-of-ease, and a
room. The value of the livings in the island has
reased by a grant of the crown of 100*l.* to the
St. Peter's Port, and 50*l.* per annum to each of
try parishes; and the tithe on fish has been com-
20*l.* for the parish of St. Michael's-in-the-vale, and
each of the other parishes, except St. Andrew's, which
border the sea. The present annual income of St.
Port may be estimated at about 480*l.*; that of the
parishes varying from 170*l.* to 100*l.* per annum.
al fonts have within a few years been erected in every
hurch; the surplice in reading the Liturgy is now uni-
used in town, and also in some of the country churches.
he Reformation, the first confirmation was held in 1818.
resent bishop of the diocese has already visited the
l Islands on four occasions, and each time has admin-
the rite of confirmation and held a visitation of the
Dissenters are numerous, chiefly of the Wesleyan
ation; there are nine dissenting places of worship in
esides chapels in every parish in the island, also a
Catholic chapel, and a meeting-house of Friends.

late Admiral Lord de Saumarez was a native of
y, as were also Major-General Le Marchant and Sir
ock, the former of whom fell at Salamanca, and the
Canada: to these names may be added Sir Edmund
governor of Virginia in 1691; the late Rev. P. P.
regius professor of Greek at Cambridge; Sir John
, governor of Sierra Leone; and Dr. John Maccul-
R.S.

present lieutenant-governor is Major-General W. F.
er, C.B., the distinguished author of the 'History of
insular War;' and the present bailiff or chief magis-
Peter Stafford Carey, Esq., late recorder of Dartmouth,
tive of the island.

er information respecting Guernsey may be obtained
, Berry, Jacobs, and Duncan's 'History of Guernsey,'
published in 1841; Inglis's 'Channel Islands;'
ton's 'Treatise on the Laws and Customs of Guern-
d Jeremie's 'Essay on the Laws of Real Property,'
d in 1841.

VINA. [Xylomelum, P. C.]

LDHALL, London. [Dance, P. C. S.]

. A description of the principal varieties of fire-
th large and small, with notices respecting the dates
invention, is given under Arms, P. C., pp. 372-376,
tillery, P. C., p. 418; and under Cannon, P. C.,
is an account of the manufacture of great guns. We
re supply a notice of the manufacture of the smaller
kinds of fire-arms, to which the names of musket or musquet, fowling-piece, rifle, &c. are applied.

The rise of the gun-manufacture in Birmingham, which is its principal seat in this country, appears to date from about the commencement of the eighteenth century. Hutton, in his 'History of Birmingham' (pp. 78, 79, of the edition of 1781), relates that, according to tradition, King William III. was once lamenting that guns were not manufactured in his own dominions, but that he was obliged to procure them, at great expense, and with greater difficulty, from Holland; when Sir Richard Newdigate, one of the members for the county, who happened to hear him, observed that genius resided in Warwickshire, and that he thought his constituents would answer his majesty's wishes. The king being pleased with the remark, the member posted to Birmingham, where the pattern was executed in such a manner as to give entire satisfaction. Large orders were immediately given, and these were so frequently repeated, that, to quote Hutton's quaint expression, the manufacturers never lost their road. From notices in Macpherson's 'Annals of Commerce' it appears that about 1787 the manufacture was prosecuted with great activity for the supply of foreign markets, the manufacture of Birmingham guns for the African market being estimated to give employment to between four and five thousand persons. By one of the strange perversities of taste, of which many examples may be found in the history of manufactures, guns marked 'London' were long preferred to those marked 'Birmingham,' notwithstanding the well-known fact that Birmingham was the chief seat of the manufacture. The Birmingham manufacturers were thus induced to stamp their goods as if made in London; and when, in 1813, a bill was brought into the House of Commons to compel every manufacturer of fire-arms to mark them with his real name and address, they took the alarm, petitioned against the bill, and instantly subscribed a large sum to defray the expense of opposing it, urging that they made the component parts of the London guns, which were, in fact, only put together and marked in the metropolis. The bill was defeated, and shortly afterwards the Birmingham gun-makers were allowed to erect a proof-house of their own, and to mark their guns, after being subjected to the proof required by the Board of Ordnance, with a distinguishing stamp. Holland, in the work referred to at the close of this article, gives some curious information respecting the extent of the gun-manufacture of Birmingham, both during the protracted war in which England was involved at the commencement of the present century, and more recently, when English artizans have been employed to meet the demands of foreign states. From his statements, founded upon authorized returns, it appears that more than two-thirds of the fire-arms made for the Board of Ordnance were supplied from Birmingham, and that the stands of arms fabricated there for the British government in the years 1812 and 1813 amounted respectively to 288,741 and 320,643. During the period of greatest activity it is said that the Birmingham manufacturers produced a musket per minute, which is not an extravagant assertion, seeing that, supposing the work to be carried on for sixteen hours every day in the year, Sundays excepted, the number produced at that rate would be 300,240, or rather under the number supplied to the government alone in 1813. The contract price at that time was 36*s.* a gun; but with the peace came a great falling off in the demand, which led many gunsmiths to abandon the trade, and caused a great reduction of price. In 1830 the Birmingham gun-makers contracted with the French government for the supply of 140,000 stands of arms at the price of about 28 francs, or rather under 23*s.* per gun, and even that price, Holland states, was considered liberal. It has been repeatedly stated by M'Culloch and others, that between the years 1804 and 1818 Birmingham supplied to government and the private trade nearly 5,000,000 fire-arms; and Barlow, quoting from authentic documents, shows that between 1803 and 1816 the number of fire-arms received and issued by the British government amounted to 3,227,716 muskets, 118,103 carbines, 27,895 rifles, and 203,266 pistols. In 1813 our allies alone were furnished with 500,000 muskets.

Before proceeding to notice some of the more interesting features of this manufacture, it may be well, to prevent misapprehension, to quote Mr. Dodd's remark, in the work referred to below, that in the great seat of the gun manufacture 'there is no such trade as a gun-maker, properly so called,' or, at least, 'there is no gun-factory; all the establishments, however large they may be, being devoted to the production of parts only of a gun.' 'The same gun,' observes this writer, 'travels about from factory to factory, from shop to shop, before it assumes its finished form; and the only person who could consistently be called a gun-maker is he who has the gun finished by putting the several pieces together.'

The most essential part of a gun is the *barrel*, or cylindrical iron tube, closed at one end, in which the explosion of the gunpowder is produced, and through which the ball or shot is projected. The interior of the barrel, which is technically called the bore, is usually a perfect and smooth cylinder, but the exterior is made slightly conical, in order that the thickness of the metal may be increased towards the *breech*, or closed end, where the explosion takes place, and where, consequently, greater strength is required than towards the *muzzle*, or open end. The very severe trials to which the barrel of a gun is exposed in use, and the fearful results which attend its bursting, render it in the highest degree important to use none but iron of good quality in the manufacture, and to work it in such a way as to render the chance of failure as remote as possible.

Military muskets generally, and the cheaper descriptions of other guns, have their barrels formed of tenacious soft iron, which is wrought or rolled into the form of flat bars, called *skelps*, each of which is sufficient to form a single barrel. The length of a skelp is usually about three feet, and the breadth about four inches at one end, where also it has increased thickness or substance to form the breech of the barrel, but gradually tapering to about two inches and a half at the other end, which is to form the muzzle. Until about the year 1811 skelps were usually manufactured by means of the forge-hammer; and as considerable skill was required to ensure the regular gradation from the thicker to the thinner end, the workmen employed in forging them were able to command good wages. In the above year, however, in consequence of a strike among the skelp-forgers for what was considered an exorbitant advance of wages, a method of fashioning them by rollers was introduced, it occurring to the inventor, according to Babbage's account, 'that if the circumference of the rollers between which the bar-iron was rolled, were to be made equal to the length of a skelp, or of a musket barrel, and if also the groove in which the iron was compressed, instead of being of the same width and depth throughout (as in the ordinary manufacture of bar-iron by rolling), were cut gradually deeper and wider from a point on the rollers, until it returned to the same point, then the bar-iron passing between such rollers, instead of being uniform in width and thickness, would have the form of a skelp.' The experiment succeeded, not only in effecting a great saving of labour, and rendering the manufacturers independent of the refractory workmen, but also in producing skelps of superior quality. 'The pure metallic particles,' according to Holland's account of this invention, for which a patent was obtained by a Staffordshire ironmaster named Bradley, 'being compressed by the rollers both edgeways and flatways at the same time, cohere more closely together; nor are the skelps so liable to veins or flaws as those which are edged up in a less hot state under a forge-hammer.' The barrels made of them are said also to turn clearer and sounder than those forged by hand.

In the old method of welding the skelps into barrels, the thicker end was first heated to redness, and then hammered upon a groove or hollow cavity in the anvil until the edges were turned up. A mandril being then inserted in the concavity between them, the edges were turned over and welded together by the hammer. By the repetition of the like process upon a length of two or three inches at a time, the skelp was gradually converted into a tube or barrel, each of the lengths thus separately welded being exposed to two or three welding operations, with alternating high and low heats, the latter being intended to correct defects occasioned by the former. Several attempts were made to substitute the action of machinery for this tedious and laborious process, in one of which, patented in 1811 by Messrs. James and Jones, and described by Holland, the power was applied by a series of automatic hammers. Little, however, was done in bringing any such process into operation until a combination was found among the welders, similar to that above referred to among the skelp-forgers, and which, if successful, would have caused the completion of a large contract which was then being executed to be attended with a very heavy loss. A method which had been patented some years before by one of the contractors, but which had not then been brought into satisfactory operation, was resorted to under this difficulty, and the result was that barrel-welding by rolling machinery soon, in a great measure, superseded *the old process*; and the manufacture of iron tubes of lighter *character, suitable* for gas or water pipes, by a similar process, was subsequently commenced. Babbage, wh
of the introduction of this process we have quote
that the combining workmen were thus permanent
to a lower rate of wages, and that as the new
welding was far less injurious to the texture o
than the old, in consequence of the iron being e
once, instead of three or four times, to the wel
the public derived advantage from the superiority
from the economy of the process. Babbage does n
the name of the person to whom the introducti
improvement is due; but Greener, in his account o
circumstances, attributes it to the late Mr. Clive, w
extensive manufacturer of iron for gun-barrels, and
the jealous opposition of the trade to his innovatio
Birmingham gun-makers to combine not to use his i

The most recent and authentic account we have s
modern improved method of barrel-welding is that
cated by Mr. Lovell, Director of the Royal arms m
at Enfield Chase, to the 'Supplement' to Dr. U
tionary of Arts,' under the title 'Fire-Arms,'
method is said to have entirely superseded that
welding by hand. From this article it appears th
of being formed of skelps forged nearly to the intend
of the barrel, barrels are now made from slabs of t
refined flat bar-iron, ten or twelve inches long, and
from ten to ten and a half pounds, or less, accordin
kind of barrel to be made. These slabs, after being
the bars by long shears, are heated, and, to adopt Mr.
language, 'bent in their whole length, by means
veniently grooved bending rolls, until they assume
of rough tubes,' their opposite edges being brough
without overlapping. These tubes are laid upon t
of a reverberating furnace, in which they are brou
full welding heat; and as soon as their edges are thus
to a semi-fluid state, they are taken out and passed
grooved rollers, the grooves of which are rather sma
the exterior of the tube. By this means the tube is
welded from end to end, and if the heat be properly
and the juncture kept clear of dirt and cinders, the
become perfectly homogeneous in every part, wit
appearance of the seam. The tubes are repeatedl
and passed through gradually decreasing grooves
rollers; and to preserve their tubular form and ens
larity in the *bore*, or internal dimension, during the
process, they are taken out of the furnace and appli
rollers, by means of a mandril consisting of a long
considerably smaller than the bore, but having at
short steel treblett made exactly the size that the
intended to be. By a simple contrivance it is arra
while the tube is passing between the rollers, th
shall always be immediately between them, so as to
bore open. The adhesion of the hot metal to the
the rolls or rollers is sufficient to draw the tube off the
By a succession of rollings the barrel is elongat
required length, and brought down to the required
tenuity; and if there be any surplus metal, it is cu
the muzzle end. Gun-barrels formed in this way
to stand proof better than those wrought by hand, be
heat is more equalized, and, in consequence of the g
gation between the rollers, any imperfections in th
mass of iron are dispersed over a greater surface.

All the processes hitherto described relate to the
ture of what are termed *plain* barrels; but some of
curious operations in the gun-maker's art relate to t
facture of the superior kind of barrel called *twisted*.
there are many varieties. In all of these the m
which the barrel is composed is rolled or forged in
bars, about equal in thickness to the intended su
thickness of the barrel, and varying in width fr
three-eighths of an inch to an inch or more. One
narrow rods or ribands of metal, being moderately
increase its pliancy, is wrapped spirally round a
mandril about the size of the bore of the intended
such a way as to form a tube, which may be slipp
mandril at pleasure. As the rods are not usually
sufficient length for one to form a barrel, several a
joined end to end, those which form the breech bei
than those at the muzzle end. In this state the
coil of metal somewhat resembling, on a large scale
of spiral spring employed by bell-hangers as a che
It is then heated to welding heat, and forged into
continuous tube partly by hammering upon a m
partly by what is termed *jumping*, or striking the

upon the floor, by which the edges of the helical or
rod are brought into very close contact, and eventually
orated together. Many successive heats are, of course,
ary in this operation, and the welding proceeds only
r three inches at a time.

e manufacture of the numerous varieties of twisted bar-
very minutely described in Greener's works, entitled
Gun; or a Treatise on the various descriptions of small
ms,' and 'The Science of Gunnery, as applied to the
nd construction of fire-arms,' especially in the first men-
d, which contains many curious details upon the various
of iron employed. From these it appears that consi-
le difficulty has arisen from the circumstance that, as the
ess of science has enabled manufacturers to produce
es of common use of very inferior qualities of iron and
the common *scrap* iron and steel, which consists of frag-
s of such articles when broken or worn out, and which is
sought after by the makers of gun-barrel iron, is very
or to what was procurable a few years since. Even
-nails, that is to say, the nails employed for fixing horse-
, and which when worn out are collected with avidity
nishing one of the best descriptions of scrap-iron, under
me of *horse-nail stubs*, are now difficult to be procured
quality required for making gun-barrels, since many
e used in this country are now made of malleable cast-
nd a few such mixed with others would spoil the iron
purposes of the gunsmith. *Wire-twist* is the technical
given to an excellent kind of twisted barrel, which by
gnorant dealers is supposed to be really fabricated of
Such barrels are formed of very narrow rods of com-
metal, composed of alternate bars of iron and steel
into one body, and then rolled out to the requisite
y, when the edges of the rods, which are brought to the
e of the barrel, will, on the application of a corrosive
which acts differently upon the two metals, present a
s or wiry appearance. In forming a barrel of such rods
s taken that the adjoining edges of the spiral be alter-
composed of iron and steel, so that the pattern may
a uniform appearance, although the difficulty of welding
reby increased. *Damascus* barrels, or rather such as
anufactured in this country under that name, are com-
of similar metal, but the rods are twisted upon their
xes until their component fibres or laminæ have from
e to fourteen turns in an inch, and the rods are thereby
ed in thickness and proportionately reduced in length.
such rods are welded together side by side, their re-
ve twists being reversed. Barrels made of rods of Da-
s iron have a very pretty appearance; but, as Greener
ves, the metal is considerably weakened by the exces-
wisting of its fibres, on the same principle, though not to
me degree, as a rope is impaired by over-twisting. Of
oint Greener gives illustrations in the results of numerous
iments made by him on the cohesive strength of various
of iron. *Stub* barrels are formed of horse-nail stubs,
d to brightness by friction in a machine, and mixed
ragments of steel, usually of old coach-springs cut up
ttle bits resembling the stubs. These stubs and scraps
edged compactly into a hoop or ring, which holds them
er while they are exposed to welding heat in a furnace,
elded into a compact mass called a *bloom*, which is drawn
y rollers into the narrow strips required for making
d barrels. Greener states that the usual proportions of
ompound metal are fifteen pounds of steel to twenty-five
s of iron-stubs; but he thinks the proportion of steel
be increased with advantage. Attempts to make barrels
el alone have frequently failed owing to its hardness.
not,' he observes in 'The Gun,' 'sufficiently tenacious
lf, from its fineness of grain, to resist the sudden ex-
n of gunpowder.' He states that when steel barrels
been found to stand proof, their shooting powers have
found very great, a circumstance which affords en-
gement to efforts for introducing them. Some makers
tried to make iron barrels with an inner tube or lining
el; but this is very objectionable, because the two
s, thus used, could not spring together, although when
ined as in wire-twist and stub-iron they may be consi-
to act as one substance, uniting the hardness of steel
the soft tenacity of iron. These remarks were published
35, and in the second work above mentioned, published in
Greener states that much progress had been made in
e of steel since 'The Gun' was published. *Stub Da-*
s is a very beautiful kind of iron formed like the Da-
s iron above described, but of stub-iron instead of wire-twist, but it is open to the same objection on the ground of over-twisting.

We may here refer to a paper communicated to the Society of Arts in 1825, and published in their 'Transactions,' vol. xliii. pp. 105-108, which contains an account of the process employed at Bombay in making gun-barrels and sword-blades in imitation of those made at Damascus; from which it appears that these barrels are manufactured of iron hoops, obtained from European and chiefly from British casks. The more they are corroded by rust, the more highly are they valued; and if they are not sufficiently oxidated they are exposed to moisture until they become so. Being cut into lengths of about twelve inches, they are formed into a pile an inch or an inch and a half high, the edges being laid straight, so as not to overlap each other, and a longer piece is so fitted as to return over each end, and hold the pile together while in the fire. After being heated the pile is drawn or forged out to a bar about an inch wide and one-third of an inch thick, which is doubled up in three or more lengths, welded together, and again drawn out as before, this operation being repeated three or four times according to the degree of fineness required. The bar is then heated, a small portion at a time, and hammered on the edge so as to flatten it out the contrary way to that of the stratification, by which operation the wire or vein is brought out on the face of the strap or riband of iron. 'The barrel is then forged in the usual way, but,' Captain Bagnold states, 'much more *jumping* is used than in the English method, in order to render the twist finer.' 'The most careful workmen,' he adds, 'always made a practice of covering the part exposed to the fire with a lute composed of mud, clay, and the dung of cows or horses, in order to guard against any unnecessary oxidation of the metal. When the barrel is complete, the twist is raised by laying the barrel from one to five days either in vinegar or a solution of the sulphate of iron, until the twist is raised; this process is called the wire-twist.' 'To produce the *curl*,' he further states, 'the bars or straps are drawn out to bars about three-quarters of an inch square, and twisted, some to the right and others to the left; one of each sort are then welded together, doubled up and drawn out as before; and upon the experience of the workman, any intricacy of twist is produced by this drawing out, doubling, and twisting.' This latter process, it will be observed, resembles that of English workmen, as also does a piece of trickery which Captain Bagnold mentions, consisting in rough-filing a common English barrel, and welding a strap of Damascus iron spirally round it, or applying several such straps longitudinally, and welding them on; a fraud which must be severely condemned as impairing the barrel in a similar way to the attempted union of iron and steel above alluded to. It is important to notice that the native Indian artists never work with coal under any consideration, but use solely charcoal from light woods.

Greener describes many other varieties of gun-barrel iron than are mentioned above, but these need not be further noticed, excepting to remark that the inferior twisted barrels are usually formed of wider rods than the better sorts, and are consequently weaker from the necessarily oblique direction of the twist, and from the circumstance that large rods do not get so thoroughly rolled as small ones, as well as from the inferior quality of the metal itself. He also describes numerous ways, often very ingenious, in which frauds are committed by unprincipled gunmakers, to avoid not only the increased cost of the superior kinds of metal, but also the increased charges for labour in almost every department upon barrels of the best quality. In some cases a strip of inferior iron will even be introduced into the heart of rods or bars of Damascus iron, by which, owing to the different expansive powers of the two metals, the gun will be impaired more than by the diminution of strength and intrinsic value.

The great amount of welding required in twisted barrels requires a very large fire, and Greener states that several hours should be spent in forging inferior barrels before the fire can be brought to a fit state for those of the best quality. Hence, he considers, the London barrel-forgers do not attain such perfection in this operation as those of Birmingham, because they do not generally make the inferior barrels necessary to bring the fire into a good state. The junction of the several lengths of rod necessary to make a twisted barrel is often effected by cutting each off in a sloping direction, and leaving them to be joined in the general welding operation; but it is better to weld them together before the twisting is completed. After welding the barrels are re-heated to a welding heat, a few inches at a time, and hammered in a groove to the required size. Sometimes they receive a subsequent hammer-hardening in like way, when cold; but though this improves them much, it is often neglected.

After welding the barrels are very carefully examined, and if needful, straightened by a few blows of the hammer. Holland states that their soundness is tried also, by placing one end in a bucket of water, and sucking with the mouth at the other end, until the barrel is full of water, when, if there be any crack or flaw extending through the substance of the metal, it may be detected by the appearance of moisture on the outside. They are then bored in a machine with an angular plug of tempered steel [Boring Instruments, P. C. S., p. 225], which is caused to revolve rapidly within the barrel, a stream of cold water being directed upon the outside to check the heat generated by the excessive friction of the tool. Greener states that the barrels are not annealed for this purpose, as Dr. Ure has represented in the 'Dictionary of Arts.' The outside of the barrel needs also to be made smooth and even, which was formerly done by applying it to the surface of a large grindstone, the workman allowing the barrel to roll slowly through his hands, so as to present every part of the surface successively to the stone; but this process is now in a great measure superseded by turning in lathes, a method which claims great economy, as well as superiority in point of accuracy, and the advantage of doing away with a most unwholesome business, and one by no means unattended with danger. In a lathe it is easy to ensure the perfect concentricity of the inner and outer surfaces of the barrel, and the perfect rotundity of the exterior surface, whereas under the old plan of grinding the sides of the gun were often very unequal in thickness, one side being in some instances nearly twice as thick as the other. In all cases it is advisable to forge the barrels as nearly as possible to their intended dimensions, in order that as little as possible of the surface, which has been condensed by hammering, may have to be removed. After the first or rough boring the interior is fine-bored with an instrument having but one cutting angle, which is kept to its work by strips of soft wood attached beside it. Generally speaking barrels are bored with a perfectly equal cylindrical bore; but some gun-makers prefer enlarging the bore a little towards the breech, under the idea that the consequent contraction of the muzzle will cause the shot to fly more closely. The breech end of the barrel is then tapped with a screw-thread, to receive the breech-plug, which closes it at that end, and forms the abutment for the explosive force of the powder, and in which, in many cases, is formed the chamber to hold the powder, and the narrow passage by which that chamber is connected with the touch-hole. The best form of this chamber, and of the connection with the touch-hole, is a matter upon which gun-makers differ widely.

The barrels are then ready for *proving*, which consists in firing them in a building in which their explosion can do no harm, with a charge four or five times as great as they will have to bear when in use. A great number of barrels are fired at once, by laying them upon a strong framework of wood, with their touch-holes downwards, and connected with a train of powder which is conducted outside the building, within which is laid a heap of sand to receive the bullets. Greener, who considers the present mode of proving to be very unsatisfactory, and recommends, among other improvements, the testing of barrels by the hydraulic pump or press, states that common barrels are so fixed as to prevent any recoil in proving, while twisted barrels are allowed to fly back into a mass of sand laid at the back of the frame, by which the severity and security of the test are very materially lessened. Common barrels, he says, are allowed to lie twenty-four hours in the proof-house untouched, in order that, by the action of the nitre in the gunpowder, any crack or flaw may be rendered visible. They are then carefully examined, and such as show any defect, or have bulged with the explosion, are returned to be reforged, after which they must be proved again, while such as have stood the test satisfactorily are stamped with a distinguishing mark. Notwithstanding the strict regulations which require every barrel to be thus tested, Greener thinks that in many cases the proof-mark is forged, and states that sometimes a cheat is committed by welding unproved tubes on to pistol barrels which have been proved, so as to convert them into gun-barrels, for the sake of saving the difference of a few pence in the cost of proving.

Sporting guns are very often made with two barrels fixed side by side upon one stock. Such barrels are made separately, and have their adjacent sides filed flat in order that they may lie close together. They are secured together by ribs running between them from end to end, and fi
spandril-shaped grooves formed by their contact. F
sporting Greener says that they should not be mo
the bores perfectly parallel with each other, but sli
verging, so that their line of fire may meet at a
tance; but opinions differ as to the best inclination
of convergence.

The wooden *stocks* upon which the barrel or
mounted is most commonly made of walnut-tree, tho
eye maple and a few other woods are occasionally u
is fitted to the barrel so accurately as to leave as little
to depend upon the metal fastenings by which the
nected together. Great care should be taken to
weight, length, and curvature of the stock to the
whose use it is intended. Greener observes that
common to make the stocks of sporting guns too sho
crooked; and Colonel Hawker, in a passage quote
land, says that 'the length, bend, and casting of a st
of course, be fitted to the shooter, who should hav
sure for them as carefully entered in his gunmak
as that for a suit of clothes on those of his tailor.'
'then,' the colonel adds, 'only to direct that his gu
well balanced, to do which the maker will introdu
proportion to their weight; so that, on holding eac
flat on the left hand, with the end of the feather-sp
half an inch from the little finger, he will find a
equilibrium to make the gun rest perfectly stea
hand.' When the shaping of the stock is compl
shod with brass, the trigger-guard and other metall
and ornaments are let into the wood, and every pa
with suitable screws and fastenings, after which th
taken to pieces; the woodwork is finished by stai
polishing, the brasswork is filed and polished, and t
are sent to be finished, which is done in various way

When intended to be bright externally, barrel
all over with smooth files, and then polished wi
burnisher. Military muskets were formerly polish
way, but the time and labour required to maintain
proved so harassing during service, that the Duke of
ton, during the Peninsular war, dispensed with
allowed the muskets to be browned. Of the variou
of browning or staining barrels we may notice tw
first of which, described by Holland, the solution
consists of half an ounce each of nitric acid and swee
nitre, one ounce of spirits of wine, two ounces of b
and one ounce of tincture of steel. These ingre
mixed, the vitriol being previously dissolved in suffic
to make, with the other fluids, a quart of mixture. T
being first thoroughly cleaned from grease and dirt, a
the muzzle and vent stopped up with wood, is wett
with this mixture, applied with a sponge or rag, an
posed to the air for twenty-four hours, after which i
with a hard brush to remove the oxide formed on t
These operations may, if requisite, be repeated tw
times, until the barrel becomes perfectly brown.
carefully brushed, wiped, and immersed in boili
which holds a quantity of alkaline matter in solutio
that the further action of the acid mixture may be
The barrel is then dried, rubbed smooth with a b
hard wood, and heated to about the temperature
water, after which it is coated with a varnish compose
of wine, one quart; pulverized dragon's blood, three
and bruised shell-lac, one ounce. When this is dry
is finally rubbed with the burnisher to give it a smo
face. The second method we shall allude to is ca
brown or stain, and is recommended by Greener as
best preventives of fraud in the manufacture of twi
since it brings out the grain or pattern in a way wh
the least, it is not easy to imitate. For producing i
rels are anointed with a little vitriolic acid, which
off, and the surface rubbed dry. A forge fire is th
and blown up, with coals containing as much hy
and as little sulphur as possible. When the coals
until they give out a clear white flame, without
smoke, the barrels are passed gradually backwards
wards through the flame until they are covered wi
sooty covering. They are then placed for eightee
a damp cool cellar, by which the iron particles w
coated with a red rust, while the steel retains it ori
coat. The rust and soot being brushed off with
steel wire, the barrels are washed and polished wi
cloth dipped in water and fine washed emery, by
two metals become very distinct, the iron being da

bright and polished. After drying, the smoking is re- d, and the barrels are left in the cellar for twelve hours, ated as before; and thus the process is repeated until arrel becomes as dark as may be wished, the darkest attainable being a fine purple-black on the iron, with a tinge on the steel.

progressive steps in the invention of the fire-lock, or ntrivance attached to the breech of a gun by which the in the touch-hole is ignited, are noticed under Arms,

The essential qualities of a gun-lock are, first, that it work easily and efficiently, so that the force required the trigger and release the spring by which the , or striking part of the lock, is moved, shall not be t to interfere with accuracy of aim and rapidity of secondly, that it should not be liable to go off at half- position in which the lock should always be kept until preparing to fire, and in which even the application to the trigger has no effect upon it), or in any other cidentally; and, thirdly, that when the piece is on full e pulling of the trigger should cause the gun to fire rtainty. The delicate workmanship of modern locks, nufacture of which forms a distinct trade, which is car- chiefly at and in the neighbourhood of Wolverhamp- aves nothing to be desired in efficiency and ease of g, while the ingenuity which has been devoted to this of mechanical science has provided numerous admira- ns for lessening the risk of accident by means of tum- other contrivances for securing those parts of the lock might occasion danger by their accidental removal. such contrivances, to give a fair account of which would too much space in this article, are illustrated by Hol- nd in Dr. Ure's 'Dictionary of Arts.' Until a com- ely recent period all military guns, and most of those for sporting purposes, were made with flint-locks, in the ignition of the priming-powder was effected by den stroke of a wedge-shaped flint against a piece of y which a stream of sparks was directed into the pan ing the priming; and the great number of flints re- for this use caused the cutting, or rather breaking, of o be a considerable branch of industry, of which a full t is given in the 'Eneyclopædia Metropolitana.' When t attempt was made to substitute for this contrivance of a fulminating or detonating powder, which, being d by simple percussion, should set fire to the ordinary wder in the touch-hole, we are not aware, but, accord- the work just referred to, the first percussion-lock was ed by the Rev. Mr. Forsyth, of Belhevie, in Scotland. mprovement has however led to alterations in the con- ion of gun-locks which, as Holland observes, are hardly r to that which took place on the substitution of the n flint for the antient fire-match. The pan which con- the priming-powder, and the cover which shielded il the moment of preparing to fire, are rendered unne- y, their place being supplied by a small upright nipple, erforation of which coincides with, and forms a continua- of, the touch-hole of the barrel. The cock, or striking of the lock, instead of carrying a clamp to hold the flint, es a simple hammer, with a snout adapted to fall exactly the top of the nipple. The fulminating substance is ly placed, for convenience, in a small copper capsule or resembling a thimble in shape, which fits on to the nip- nd, if not blown to pieces by the explosion, is removed us to reloading. The hammer is provided with a shield vent any fragments of the copper cap from flying against ce of the shooter. The great superiority of the percus- rinciple in safety and certainty of action has at length its adoption, after experiments most decisive as to its ority, especially in wet weather, over the flint-lock, for muskets of the British army. A long article relating compounding and use of percussion-powders made with nate of mercury, which forms the base of most such com- ons, is given under 'Fulminates,' in Dr. Ure's 'Dic- ry of Arts;' and in the Supplement to that work, r 'Musquet,' are representations of the details of the new ussion-guns supplied to the British army, copied from the rations to a pamphlet of instructions for cleaning and ging them, compiled by Mr. Lovell, of the Royal Arms ufactory.

ifled guns are described under Rifle, P. C., p. 11.

reener, *The Gun*, and *Treatise on Gunnery*; Holland, *Ma- ctures in Metal*, in Lardner's 'Cabinet Cyclopædia,' vol. p. 94-123; Barlow, *Treatise on Machinery and Manufac-* , in the 'Encyclopædia Metropolitana;' Dodd, *British Manufactures—Metals*, in Knight's 'Weekly Volume,' pp. 102-107; Dr. Ure, *Dictionary of Arts*, and *Supplement*, art. 'Fire-arms,' &c.; Babbage, *Economy of Machinery and Manufactures*, sec. 362, 363.)

GUNST, PIETER VAN, an excellent Dutch portrait engraver, who however possessed more patience than ability, was born at Amsterdam about 1667. He engraved a set of ten full-length portraits, after Vandyck, from drawings made in England in 1713 by Arnold Houbraken, who received one hundred florins each for them. He also engraved a set of portraits after Vander Werff, for Larrey's History of England; and he engraved the portrait of Franciscus Junius, after Vander Werff, which is inserted as a frontispiece to the 'Pictura Veterum,' Rotterdam, 1694. His works are extremely neat in execution, especially the heads; he appears to have studied the works of the Drevets. Among his historical or figure pieces, which are inferior to his portraits, are nine Loves of the Gods, after Titian. The date of his death is not known.

(Vertue, *Catalogue of Engravers*; Huber, *Manuel des Amateurs*, &c.)

GUNTER'S SCALE. [Sliding Scale, P. C.]

GUTHRY, HENRY, a Scottish ecclesiastic, was the son of John Guthry, clergyman of Cupar Angus in Forfarshire, where he was born soon after the commencement of the seventeenth century. He studied at St. Andrews, and when he became capable of holding a benefice, he was presented to the church of Stirling. In 1638 he subscribed the Covenant, but he is said never to have had much sympathy with its promoters, and he was inclined to neutrality in the discussions which followed. In 1647 he was one of those who joined the 'Engagement' for the support of Charles I. against the Parliament, a course of conduct which occasioned his deposition from the ministry. He was succeeded by a celebrated namesake, apparently a member of the same family, James Guthry, who having shown a resolute hostility to Charles II., his followers, and his ecclesiastical polity, was beheaded after having been convicted on a charge of high treason in 1661. The more moderate or cautious Henry was then restored to the benefice. He conformed to the re-establishment of Episcopacy, and was appointed bishop of Dunkeld in 1665. He died in 1676, leaving behind him a MS. History of his Own Time, which was published in 1748.

(*Life*, by George Crawford, prefixed to *Memoirs of Henry Guthry, late Bishop of Dunkeld.*)

GYMNADE'NIA, a genus of plants belonging to the natural order Orchidaceæ and the tribe Ophrydineæ. It is distinguished from the genus Orchis by the glands of the pollen masses being without a pouch. There are two British species, *G. conopsea* with equal lobes of the lip, and *G. albida* with unequal lobes of the lip. They are found in mountainous and hilly pastures, and blossom in June and July.

(Babington, *Manual of British Botany*.)

GYMNO'CLADUS (from γύμνος, 'naked,' and κλάδος, 'a branch'), a genus of plants belonging to the natural order Leguminosæ. It has diœcious flowers; the calyx tubular, 5-cleft; the petals five, equal, oblong, exserted from the tube; the stamens ten, enclosed; the legume oblong, thick, filled with pulp inside. There is but one species, *G. Canadensis*, the Kentucky Coffee-tree. It is an upright deciduous tree, with compound alternate, stipulate, bipinnate leaves, and white flowers in terminal racemes. The branches of this tree are without any appearance of buds, which, during the winter, gives it the aspect of a dead tree, and hence the Canadian name *chicot*, or stump-tree. The wood is hard, compact, and of a fine rose colour. In America it is used in cabinet-making and carpentry. It has the property of rapidly converting its sap-wood into heart-wood, so that the smallest trees may be converted to useful purposes. The seeds were at one time roasted and ground as a substitute for coffee in Kentucky and Tennessee; but they are not often used in this way at the present day. The pods, preserved in the same way as the tamarind, are said to be wholesome and aperient. This tree grows well in Great Britain, but does not ripen its seeds. It is best propagated by imported seeds, but it will also grow freely from cuttings of the roots. It requires a rich, deep, free soil.

(Loudon, *Encyclopædia of Trees and Shrubs.*)

GYRACA'NTHUS, a genus of fossil Placoid fishes, from the mountain limestone and coal strata: four British species. (Agassiz.)

GY'RODUS, a genus of fossil Ganoid fishes, from the oolitic and cretaceous strata chiefly: ten British species. (Agassiz.)

GYRO'LEPIS, a genus of fossil Ganoid fishes, from the new red-sandstone strata and bone-beds of the lias: three British species. (Agassiz.)

GYRO'NCHUS, a genus of fossil Ganoid fishes, from the oolite of Stonesfield. (Agassiz.)

GYROPHORA. [Liverworts, P. C. S.]

GYROPRI'STIS, a genus of fossil Placoid
the red-sandstone near Belfast. (Agassiz.)

GYRO'STEUS, a genus of fossil Ganoid fish
lias. (Agassiz.)

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